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ABSTRACT

This energy activity guide, developed and field tested in Colorado, presents teaching units and strategies to aid home economics teachers to teach energy management. The guide is divided into six subject areas: introduction (background information on energy use and conservation); foods and nutrition; clothing and textiles; housing and home furnishings; child development; and personal and family relations. Each area, except the introduction, is divided into six to twelve units. Each unit contains objectives, background information, suggested activities, evaluation techniques, and student assignments. Resources and materials are also suggested. (KC)

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Energy Management Strategies for Home Economics Teachers

U S DEPARTMENT OF HEALTH.
EDUCATION & WELFARE
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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

FOREWARD

This guide is for home economics educators who want to "do something" about the energy problem. Recognition of the need to develop activities for home economics is simply another indication of the seriousness of the energy crisis. If we wish to find solutions to our energy problems, we must raise the level of energy literacy in this country. There *are* things we can do to help citizens of the future to be more knowledgeable about energy, and to begin now to make wise decisions about energy use. This book was developed to help accomplish that purpose.

In February, 1979, a group of educators and industry leaders in Colorado including: Home Economics Division of the State Board for Community Colleges and Occupational Education, Denver Public Schools, Energy and Man's Environment, Jefferson County Public Schools and Public Service Company of Colorado met to discuss plans for the development of an energy activity guide for home economics teachers. Materials already available on energy/home economics were identified. These materials were categorized into five content areas:

1. Food and Nutrition
2. Clothing and Textiles
3. Housing and Home Furnishings
4. Child Development
5. Personal and Family Relations

At that point, the group decided to incorporate existing high quality material into the guide and to strengthen weak content areas by creating new material.

The Steering Committee obtained financial support from the Home Economics Division of the State Board of Community Colleges and Occupational Education and from Jefferson County Public Schools to fund a preliminary writing effort. Ten classroom teachers participated. Each content area was assigned a team consisting of a Public Service Company of Colorado Home Economist and two home economics teachers. These teams developed the units of instruction. Funds for the draft edition were provided by Energy and Man's Environment. Following a field test conducted by teachers in the various geographic areas of the state, revisions were made and the final edition published through funds provided by Public Service Company of Colorado.

We recognize that this information is of a dynamic nature and a continuous effort must be made to include new considerations and developments. These units should be viewed as a starting point for teachers who can then personalize and adapt them to meet the needs of their students. When you use these materials and have comments, we would appreciate your feedback.

Permission is hereby granted to educational institutions to reproduce portions of this manual for individual classroom instructional purposes. Other reproduction is not permitted without the express written consent of the steering committee.

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ENERGY & MAN'S ENVIRONMENT
Educational Programs for Energy Literacy

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Personal and Family Relations PFR 1-1 - 12-1

INTRODUCTION

Prior to beginning the units designed for the specific areas of instruction, you may wish to spend some time discussing with your students the need for wise use of energy. Some suggestions are:

- Movies available from Public Service Company of Colorado:
  - "Energy - Critical Choices Ahead"
  - "Living with Energy - 1979"
- "You - The Energy Game" (attached)

unit of instruction: Introduction

subject area: Energy

suggested for: Junior and Senior High School

UNIT OBJECTIVE

Students will become aware of some basic facts concerning energy use and conservation.

GENERALIZATION

Through understanding and application of energy facts, one can change daily habits to save money and resources for self, family,state and national interests.

MATERIALS AND EQUIPMENT:

Game Board, markers, decks of question cards and "Special" cards, lists of questions and answers, rules for game.

INTRODUCTION: Have materials out on tables. As an attention-getter, ask the following questions:

How many know what your family electricity bill was last month?
How many know how to read your gas meter?
How many of you saved water in the last couple of days by taking a quick shower instead of a bath?
How many of you either walked to school or car-pooled to school today?
How many of you can list three forms of energy?

Pass our rules of YOU - The Energy Game and Discuss.

RULES FOR PLAYING:

1. Divide students into groups of four or five. One student in each group should act as monitor with the answer key.
2. Shuffle decks of cards.
3. Each player should select a different marker and place it on the "Start" square.
4. Each player takes his/her turn by drawing the top card on the pile of question cards and stating aloud the number of the question. The question and answer should be stated to the group. If the player answers the question correctly according to the answer sheet, she/he advances the number of squares indicated on the card. If the player answers incorrectly, she/he remains on the same square.
5. Players landing on a "Special" square will pick a card from the "Special" deck and follow directions given on card.
6. Play continues in a clockwise rotation until someone reaches the "Success" square on the board. The first player to do so is the winner.
7. Questions with more than one possible answer may be accepted by group and/or teacher approval.

EVALUATION

Teacher observation of individual student's progress. Note question areas students did and did not know.

unit of instruction:	**subject area:**	**suggested for:**
Introduction	Energy	Junior and Senior High School

Continued

Question Cards:

1. Give the name or the symbol for the independent testing agency which tests products for safety.
   (Underwriters' Laboratory or UL) 2 points

2. T-F If electric appliances are disconnected before cleaning or repairing, there is no danger of electric shock.
   (True) 1 point

3. The amount of power used by most small appliances is measured in ______.
   (Watts) 2 points

4. T-F You get more light from one 100-watt bulb than from two 50-watt bulbs even though they use the same amount of energy.
   (True) 1 point

5. T-F Fluorescent lights are more efficient and more economical than incandescent lights.
   (True) 1 point

6. When baking in the oven with aluminum foil, which side should be to the outside?
   (Dull side) 2 points Why? (Helps to absorb heat) 2 points (4 points total)

7. Of the energy consuming equipment in the average home, which two use the highest percentage of energy. (Furnace-heating and the water heater) 2 points each answer = 4 total points

8. List two hints in cooking foods which save energy. (Cook at lowest suitable heat, use little amount of water, thaw foods completely before cooking, do not overcook, or use tight fitting lid.) (Other answers possible.) 4 points

9. T-F Hot water aids in optimum use of the garbage disposal.
   (False) 1 point

10. One dripping faucet may cause the loss of a possible total of ________ gallons of water per day.

    A. 5 gallons B. 25 gallons C. 50 gallons

    (C = 50 gallons) 1 point

11. When using the clothes washer to keep energy and water usage to a minimum, match the water level to the ______ size.
    (Load) 2 points

unit of instruction:	**subject area:**	**suggested for:**
Introduction	Energy	Junior and Senior High School

Continued

12. T-F As a general rule, small appliances use less energy than large ones when preparing a given food.
(True) 1 point

13. List two features of pots and pans which help conserve energy (besides the materials they are made of).
(Tight fitting lid,straight sides and flat bottoms) 4 points

14. Why do surface burner pans save energy when kept shiny and clean?
(Reflect more heat) 3 points

15. Of the following, which 3 appliances use the most electricity?

A. Clock, electric blanket, electric skillet
B. Refrigerator-freezer, toothbrush, mixer
C. Vacuum cleaner, can opener, dishwasher)

(Refrigerator-freezer, toothbrush, mixer)
2 points

16. T-F A pop-up toaster uses less energy than a toaster oven.
(False) 1 point

17. Name 2 ways to reduce energy used by the freezer.
(Planning trips to avoid opening door too often, keep freezer as full as possible, defrost often. (Other answers possible.)
4 points

18. Name one way we can use the clothes washer to save energy.
(Full loads, cold water rinses) 2 points

19. List at least two ways to save energy when drying clothes.
(Keep filter clean, dry only until damp, remove clothes immediately, use only for bulky items, use clothes lines) 4 points

20. List an effective way of reducing energy used by the dishwasher.
(Open door during heat cycle and let air dry, wash only full loads.) (Other answers possible.) 2 points

21. T-F A dishwasher requires the same amount of energy to wash a 3-place setting of dishes as it does to wash an 8-place setting load.
(True) 1 point

22. Choose the best answer. Cooks may reduce heat loss in the oven by avoiding: (a) Turning the light on during cooking; (B) Opening the oven door during baking: (C) Use of metal pans in the oven. (B) 2 points

unit of instruction: Introduction

subject area: Energy

suggested for: Junior and Senior High School

Continued

23. Name 2 ways to reduce energy used by the refrigerator.
(Avoid opening door often, avoid packing the refrigerator; if safety is not a factor, cool hot foods before refrigeration. (Other answers possible.) 4 points

24. Why do self-cleaning ovens use less energy than regular ovens during oven baking?
(More insulation in self-cleaning oven.) 3 points

25. T-F A 5% moisture content left in clothes after drying cycle will reduce wrinkling if they are removed immediately. (True) 1 point

26. T-F If dried on the permanent press cycle, clothes will wrinkle less if allowed to cool in the dryer before removing. (False) 1 point

27. T-F A non-self-cleaning oven costs less per hour to use than a self-cleaning oven. (False) 1 point

28. T-F At 1979 prices a gas clothes dryer costs more to operate per load than an electric clothes dryer. (False) 1 point

29. T-F If preparing two baked potatoes, it takes less energy to use the microwave than a regular oven. (True) 1 point

30. T-F Pre-heating your oven for 15 minutes before baking saves energy. (False) 1 point

31. T-F Microwave cooking is most efficient at the high setting. (True) 1 point

32. List a technique to use to conserve water when preparing dishes for the dishwasher.
(Use rubber spatula-no need to rinse off dishes.) 3 points

33. Explain how keeping drinking water in the refrigerator saves water.
(Eliminates need to run water in faucet to get cold water.) 2 points (Also allow 2 points for answer: It won't save water for those who are willing to drink it at tap temperature.)

34. Why does using cold water in the washer save energy?
(Eliminates water heating costs) 2 points

35. T-F Washing a full load of clothes takes less water than two half-loads. (True) 1 point

36. When hand rinsing dishes, list a technique to save water. (Do not leave water running during rinse. Fill sink full of water and dip dishes in.) 2 points

Continued

37. List two refrigerator placements which increase its energy use. (Heat vent, dishwasher, range, windows and sunlight may cause energy loss if next to the refrigerator.) 4 points

38. Give one way to conserve water regarding faucets. (Shut off faucets completely, put a water-saver on shower head, repair leaky faucets.) 2 points

39. Why should user manuals for equipment be read in order to save energy? (To get most efficient use of your equipment, prevents possible damage, prevents safety hazards) (Other answers possible.) 2 points

40. T-F If a glass pan is used for baking a cake, the baking time will be decreased. (False) 1 point

41. T-F Keeping your freezer defrosted results in less energy use. (True) 1 point

42. T-F Energy efficiency is reduced when overloading electrical circuits. (True) 1 point

43. Name 3 places in your home where warm air may escape during the winter. (Cracks, doors, windows, fireplaces, walls, foundations, ceilings) Other answers possible.) 3 points

44. Name 2 ways to reduce heat loss from the home. (Stop air leaks, replace furnace filters, add insulation, use of storm windows, caulking and weatherstripping windows and doors, other answers possible.) 2 points

45. T-F An automatic defroster refrigerator uses the same amount of energy as does a manual defrosting refrigerator. (False: It uses more.) 1 point

46. Give three examples of where human energy can substitute for fuel energy. (Opening can by manual method, washing dishes by hand, avoiding use of electric toothbrush, ride a bike or walk, hanging clothes on lines to dry) (Other answers possible.) 3 points

47. T-F Keeping the lint filter clean in the clothes dryer has no effect on the energy efficiency of that appliance. (False) 1 point

48. Explain why using light colors for walls and ceiling helps to conserve energy. (Reflects more light and requires less artificial lighting.) 2 points

49. T-F Space heaters are low energy users. (False) 1 point

50. How do oven timers help reduce energy waste? List one way. (Eliminates opening oven door and/or lifting lids) (Other answers possible.) 1 point

unit of instruction: Introduction

subject area: Energy

suggested for: Junior and Senior High School

Continued

51. If preparing a chicken for casseroles, which appliance would be the most energy-efficient to use. Choose best answer. (a) microwave, (b) pressure cooker, (c) simmering on low heat on range. (pressure cooker) 1 point

52. When is the best time to use the self-cleaning feature on a dirty oven? (When oven is already hot or a night when fuel use is lower.) 2 points

"SPECIAL" CARDS

1. Advance 2 spaces. Stand up and shout Energy Conservation.
2. You have just opened the refrigerator door for the tenth time in preparing a meal. Go back 3 spaces.
3. You used the wrong size of burner for pan size. Go back 2 spaces.
4. You used clothes line instead of clothes dryer. Go ahead 2 spaces.
5. You opened your can manually. Go ahead one space.
6. You left the water running while you peeled the onion. Go back one space.
7. You forgot to turn out the lights when leaving the kitchen. Go back 2 spaces
8. You forgot to turn off the oven after you took your pizza out. Go back 2 spaces.
9. You peeked in the oven at your masterpiece three times and lost oven heat. Go back 2 spaces.
10. You learned to use the pressure cooker to save energy. Move ahead 3 spaces.
11. You remember to set the oven timer to eliminate opening door to check on your souffle. Move ahead 2 spaces.
12. You are remembering to use the microwave for small quantities of food. Go ahead 2.
13. You planned an oven meal with foods which were baked at the same time. Move ahead 2 spaces.
14. You cleaned the refrigerator coils to help save energy. Go ahead 1 space.

DEVELOPED BY

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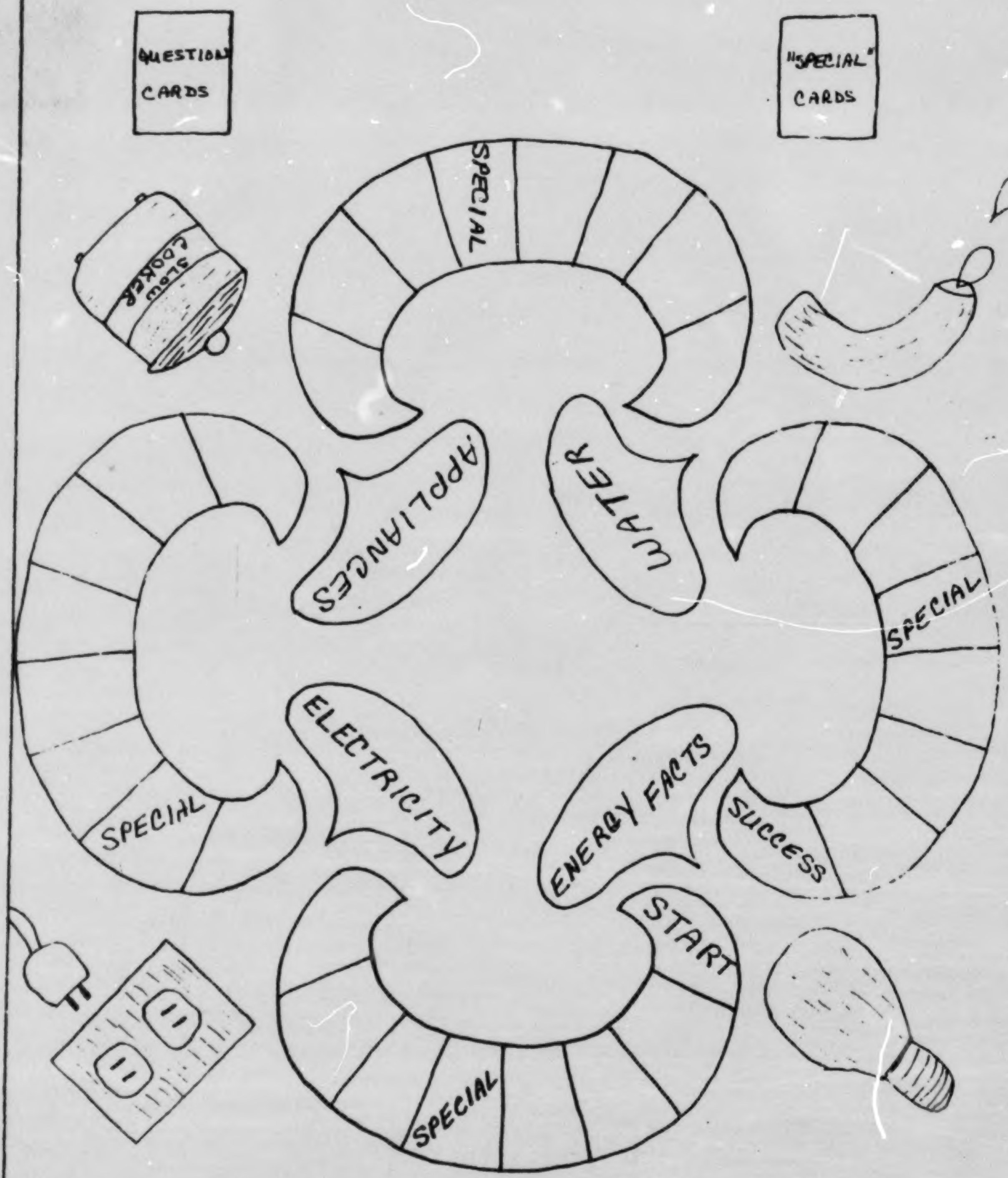
Thompson Valley High School

unit of instruction:
Introduction

subject area:
Energy

suggested for:
Junior and Senior
High School


QUESTION CARDS
"SPECIAL" CARDS
SLOW COOKER
SPECIAL
APPLIANCES
WATER
SPECIAL
SPECIAL
ELECTRICITY
ENERGY FACTS
SUCCESS
START
SPECIAL

YOU - THE ENERGY GAME

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Unit IV. - Energy Used in Food Preparation

Unit V. - Energy Use in Kitchen Cleanup

Unit VI. - Foods and Nutrition Resources

unit of instruction:

Energy Awareness

subject area:

Foods and Nutrition

suggested for:

Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

Student is able to identify uses of energy as related to foods and nutrition.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to give examples of sources of energy expenditure in the kitchen.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES FOR LEVEL I Time: 20 minutes

1. Have students bring pictures of an appliance (used frequently from catalogues, magazines, etc.) in the kitchen to class.
2. Make a bulletin board or collage about energy usage in the kitchen using pictures.

SUGGESTED ACTIVITIES FOR LEVEL II Time: 15 minutes

Teacher displays cartoon of kitchen with abundance of electrical appliances and gadgets. A caption comes from the television, "The President announces -"all households must cut back on energy expenditures". A couple thinks, "How could we possibly help?"

Students brainstorm picking out all possible energy uses in the picture. Additional items might include:

1. calculating the amount of energy used by each appliance.
2. group appliances by similar jobs accomplished and compare the energy used by each.

EVALUATION TECHNIQUES

Successful student interaction during discussion.

SUGGESTED MATERIALS AND RESOURCES

Cartoon and overhead or opaque projector.
Transparency or handout master.

DEVELOPED BY

Jan Scrogan
Lois Stone

background information

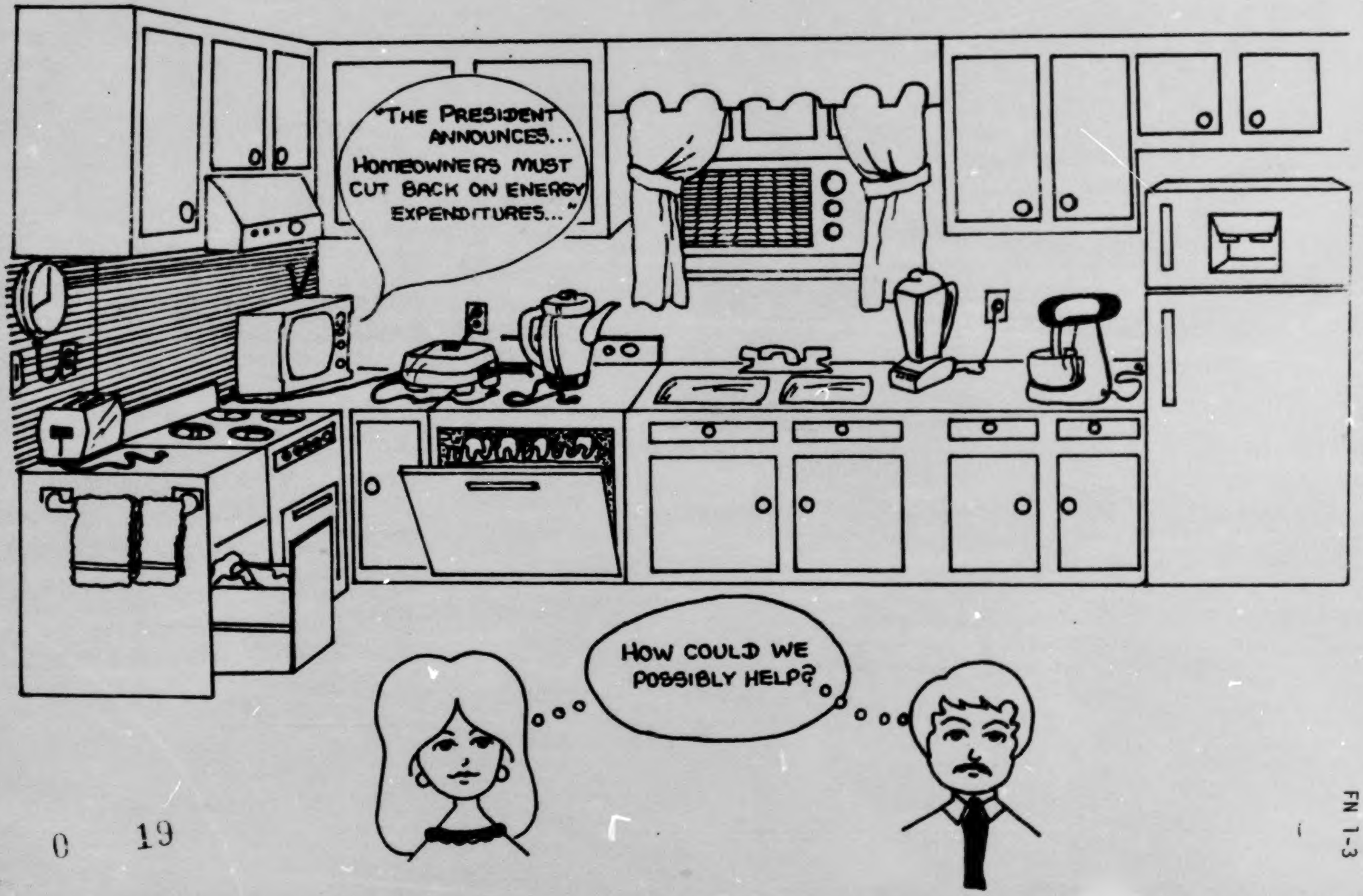
The high productivity of the American food industry depends on large quantities of energy to produce, process, transport, store and prepare a large variety of foods. As a result, advanced agricultural systems are running up an energy deficit. As the geographic distance from producer to consumer lengthens, the degree of processing increases and energy is substituted for labor and natural soil fertility, the energy deficit increases.

In 1910, the energy content of food produced in the U. S. was slightly greater than the energy used to grow, process and transport the food. In 1970, however, nine times as much energy was consumed by the food system than was contained in the food produced. In other words, by the time the food reaches the consumer's plate, the total energy expended is many times that contained in the food being eaten. It is the processing, transportation, and distribution of the food that absorbs most of the energy. Therefore, it is wise to select food items carefully, as well as to store and prepare them efficiently.

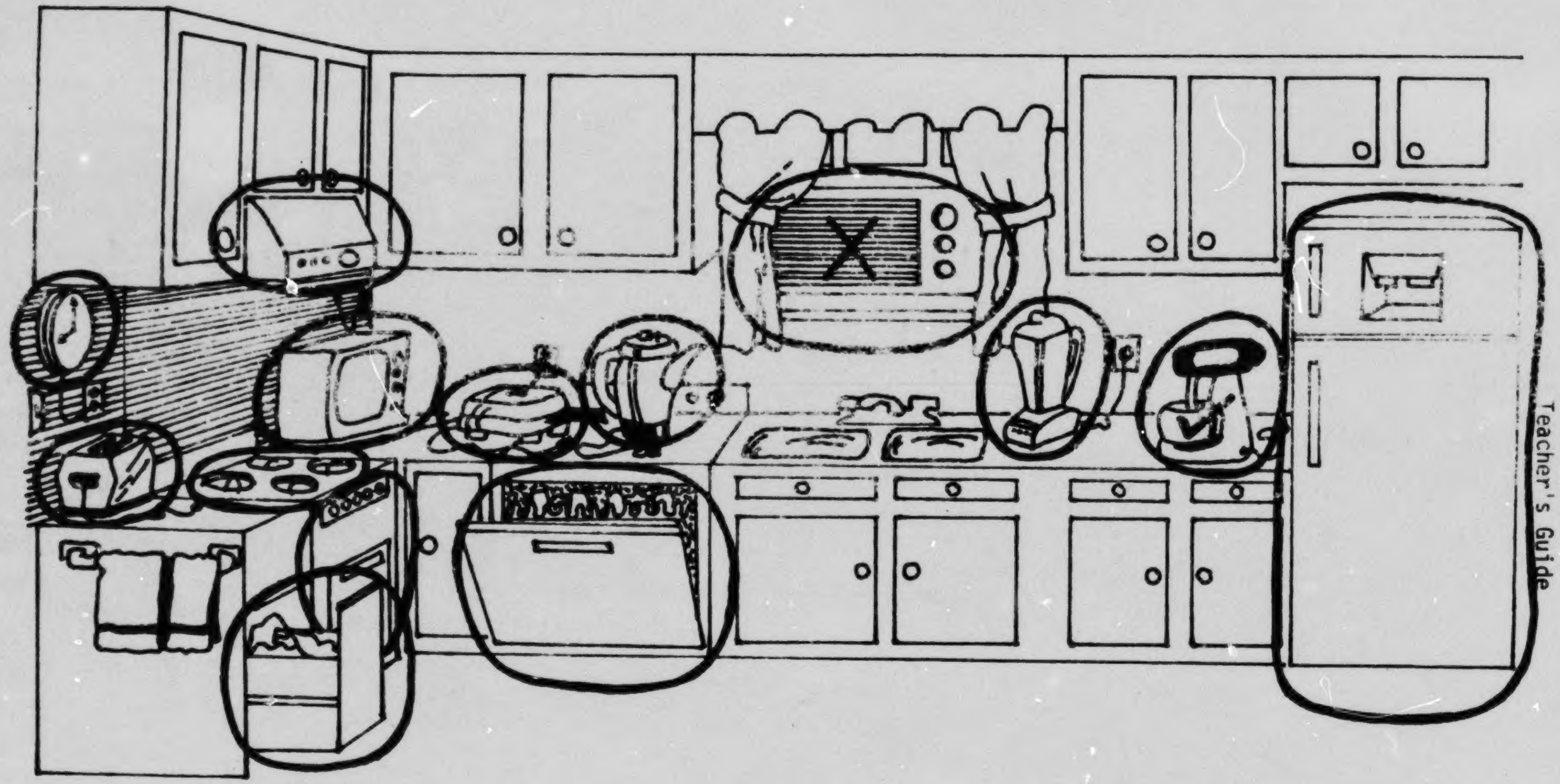
The home preparation of food accounts for almost four percent of the total U. S. energy consumption. The major in-home energy consumption for food occurs in storage (refrigeration and freezing) and preparation (ranges, ovens and small appliances).

The storage and preparation of food includes energy use by appliances both directly and indirectly. There is direct use of energy for refrigeration, cooking and dishwashing. The indirect use of energy is for hot water, to maintain a comfortable room temperature where appliances are operating and for manufacturing the appliances. Appliances and equipment account for 33 percent of the energy consumed in the home. The water heater, refrigerator and range are the top energy users.

Credit to: U. S. Department of Energy, SECTION 6 - FOOD


"THE PRESIDENT ANNOUNCES... HOMEOWNERS MUST CUT BACK ON ENERGY EXPENDITURES..."
HOW COULD WE POSSIBLY HELP?

Student Material



unit of instruction:
Energy Awareness

subject area:
Foods and Nutrition

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

The student will be able to identify uses of energy as related to foods and nutrition.

SPECIFIC OBJECTIVES

Given the opportunity to contemplate a depletion of energy sources, the student will be able to evaluate the implications of decreasing energy supplies.

SUGGESTED ACTIVITIES FOR LEVEL I Time: 25 minutes

Describe to the students a situation wherein energy sources, as we know them now, are gradually being depleted. Ask each student to list ten or twenty activities which would change or cease under such circumstances. Bring the class together for a discussion of their lists. Have papers turned in.

SUGGESTED ACTIVITIES FOR LEVEL II Time: 25 minutes

Ask the students to examine a grocery list (can be obtained from USDA, Consumer Information Department or Extension Agent).

1. If the situation described in the Level I activity came true, what food items would be removed from the grocery list? Why? Consider the energy consumed in processing, transporting, storage, etc.

2. What food items would be available? Would they be highly perishable? How could they be transported or stored without energy? What alternatives are there?

EVALUATION TECHNIQUES

Given the opportunity to contemplate the depletion of energy sources, the student will be able to list a number of activities which would change or cease.

DEVELOPED BY

Merodee L. Smith
Energy & Man's Environment

unit of instruction:	**subject area:**	**suggested for:**
Energy Awareness	Foods and Nutrition	Level I (Junior High)

UNIT OBJECTIVE

The student will be able to identify uses of energy as related to foods and nutrition.

SPECIFIC OBJECTIVES

After completion of this unit the student should be able to list common consumable foods and identify the sources of energy used in providing food.

SUGGESTED ACTIVITIES

Ask students to list all the different foods including snacks, drinks, etc., consumed in two average days.

Under each food, ask students to list the sources of energy required in producing it. In some instances this will necessitate also listing the products involved in the preparation of the food, i.e., in bread - flour, yeast, shortening, sugar, etc. Have students list the source of energy next to each item and state whether the sources are renewable or non-renewable.

Considerable energy was drawn from sources in making it possible for the food to be prepared. Machines, equipment, transportation, processing plants, etc., are all involved in processing the food we consume. Ask students to list as many of these as they can and to identify the sources of the energy they required. Have students state whether the sources are renewable or non-renewable.

1. Students can conclude from their research that there is an extreme drain on energy sources in supplying our nation with food.
2. Have students write as many suggestions as they can for conserving energy demands, yet meeting needs adequately. (Please note the word adequately does not mean an unnecessary surplus or a luxury standard.)

EVALUATION TECHNIQUES

Given the opportunity to identify and list the sources of energy used in providing daily essential needs, the student will be able to suggest means to conserve the sources of energy.

DEVELOPED BY

Energy & Man's Environment, Energy & Conservation Education: Activities for the Classroom, Grades 7-9.

unit of instruction:
Energy Awareness

subject area:
Foods and Nutrition

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

The student will be able to identify uses of energy related to foods and nutrition.

SPECIFIC OBJECTIVES

Given the opportunity to identify and appraise the use of kitchen appliances, the student will be able to identify kitchen appliances, their frequency of use and those most necessary in daily food storage and preparation.

SUGGESTED ACTIVITIES FOR LEVEL I & II

1. Ask students to collect a set of pictures of home appliances. These may be cut from catalogues, magazine advertisements, etc.
2. Mount them on a large sheet of poster cardboard. Students may need more than one sheet. Assist students in getting these sheets. (If you prefer, they could make a booklet.)
3. As they mount the picture of each appliance, have the students write the following information on a 3" x 5" file card and mount it by or under the picture.
   a. Name of appliance.
   b. Number of times per day it is used (this may be also stated as once in a week, if so, write 1 in 7, etc.).
   c. Calculate monthly cost of each appliance.
   d. On the last line, have students give the appliance a rating. For instance, if they have pictures of ten appliances, have them place a 1 by that appliance they would keep if it were necessary for them to give away all appliances but one. If they could keep two, which one would they choose next? Give it a rating of 2, etc. The one they would do without first would receive a rating of 10.
   e. On the last line, ask students to list two ways they believe they could reduce the amount of electricity being used by this appliance in the home now.

EVALUATION TECHNIQUES

Given the opportunity to identify and appraise the use of home appliances, the student will be able to identify those for which the electrical energy use could be reduced.

SUGGESTED MATERIALS AND RESOURCES

Magazines and catalogues

DEVELOPED BY

Mabel Lund
Energy & Man's Environment

unit of instruction: Energy Awareness

subject area: Foods and Nutrition

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

The student will be able to identify uses of energy as related to foods and nutrition.

SPECIFIC OBJECTIVES

Given the opportunity to assess a list of personal energy-use choices, the student will be able to form judgments using terms good, bad; right, wrong; better, worse, etc., with regard to lifestyle choices that deal with energy use.

SUGGESTED ACTIVITIES FOR LEVEL I & II

Use suggested films as discussion starter.

The student is to assess the ways in which he or she uses energy. It should be emphasized that personal choice is involved in energy use.

Students assign priorities within the list in terms of necessity.

Students attempt to judge his or her own wise and unwise uses of energy (forming judgments about choices taken).

Class discussion of these items.

Class passes judgment on a collection of these uses. (This is intended to focus attention on our energy-intensive lifestyles.)

EVALUATION TECHNIQUES

Student will be able to evaluate personal energy uses as valid or needless.

SUGGESTED MATERIALS AND RESOURCES

Films:

"The Energy Dilemma"
Films, Inc.
5625 Hollywood Boulevard
Hollywood, California 90028

"Leisure"
Pyramid Films
P. O. Box 1048
Santa Monica, California 90406

unit of instruction:	**subject area:**	**suggested for:**
Energy Awareness	Foods and Nutrition	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

The student will be able to identify uses of energy as related to foods and nutrition.

SPECIFIC OBJECTIVES

After completion of this unit, students will be able to identify energy expenditure in the production of specific foods.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES FOR LEVEL I & II

1. Hand out energy menu sheets and ask students to select an appetizer, main dish, potato, drink and dessert based on their preference alone.

2. Show the chart on energy use in the food system. (See FN 1-16). Discuss the form of energy used in each step - is the energy resource renewable or nonrenewable? For example, transportation depends heavily on petroleum products, which is non-renewable. Take one food - orange juice - and discuss its route through the food system.

3. Analyze an average breakfast and ask questions such as where students pick the foods that are the least energy intensive? (Home, fast food restaurant, cafeteria, etc.). The ranking of food choices according to energy intensity are listed on the teacher's sheet. Generally, the less processed the food, the less energy it consumes. When foods are prepared in volume, generally the energy use per unit is less than when food is prepared in small amounts as is done in home preparation.

4. If time permits, find where the most and least energy-intensive foods are grown and processed. Have students write another menu using locally produced and processed foods. Does buying locally produced food affect the economy?

EVALUATION TECHNIQUES

Teacher observation of food selection by students in future laboratory experiences.

SUGGESTED MATERIALS AND RESOURCES

Energy menu sheets for each student
Chart of energy used in the food system
Opaque projector

DEVELOPED BY

Montana Power
U. S. Department of Energy

background information

With fast-moving lifestyles, we have shifted away from home production of clothes, furniture - and food. Convenience is highly valued, but costly in terms of energy consumption. The more a food is processed, the more energy is consumed. We have become accustomed to having oranges in February, lettuce year-round and coffee every day. These were luxuries just a few years ago. Transportation and heated greenhouses have made it possible for us to enjoy a variety of foods. But variety also has a very high energy bill.

McSUNALD'S

ENERGY MENU

	Choice of One	Uses Least Energy
APPETIZER		
Frozen Orange Juice		
Canned Orange Juice		
Fresh Orange Slices		
MAIN DISH		
Hot Dogs		
Chicken (fresh)		
Fish (frozen cod)		
Grass-Fed Hamburger		
Grain-Fed Hamburger		
POTATOES		
Fresh Boiled Potatoes		
Frozen French Fries		
Dehydrated Hash Browns		
BREAD		
Bakery Bread		
Commercially Made Bread		
Home-Baked Bread		
DESSERT		
Fresh Apple Slices		
Apple Crisp		
Applesauce		

McSunald's Energy Menu

	Choice of One	Uses Least Energy	
APPETIZER			
Frozen Orange Juice		3rd	(Uses Most)
Canned Orange Juice		2nd	
Fresh Orange Slices		1st	(Uses Least)
MAIN DISH			
Hot Dogs		4th	Reasons: Amount of processing, type of feed used for fattening, distance and type of storage
Chicken (fresh)		1st	
Fish (frozen cod)		5th	
Grass-Fed Hamburger (Less tender-moist heat needed for cooking)		2nd	
Grain-Fed Hamburger		3rd	
POTATOES			
Fresh Boiled Potatoes		1st	Reason: Type of storage, processing, energy used
Frozen French Fries		3rd	
Dehydrated Hash Browns		2nd	
BREAD			
Bakery Bread		2nd	Reason: Volume or energy used per unit produced
Commercially Made Bread		1st	
Home-Baked Bread		3rd	
DESSERT			
Fresh Apple Slices		1st	Reason: Amount of processing, use of oven for crisp
Apple Crisp		3rd	
Applesauce		2nd	

assignment

DIRECTIONS:

1. Go through the menu and put an "X" in the first column under preference in the blank to the left of the dollar sign.
2. Using the background information given, fill in the cost of the item you chose under column #1.
3. Fill in the cost of all items under column #2. Circle the item which costs the least amount of energy.
4. In column #3, show the difference between your choice and the lowest energy cost. If there is no difference, put a zero in the blank.
5. Total all three columns. If you subtract column #2 from column #1 you should have the same answer as column #3.

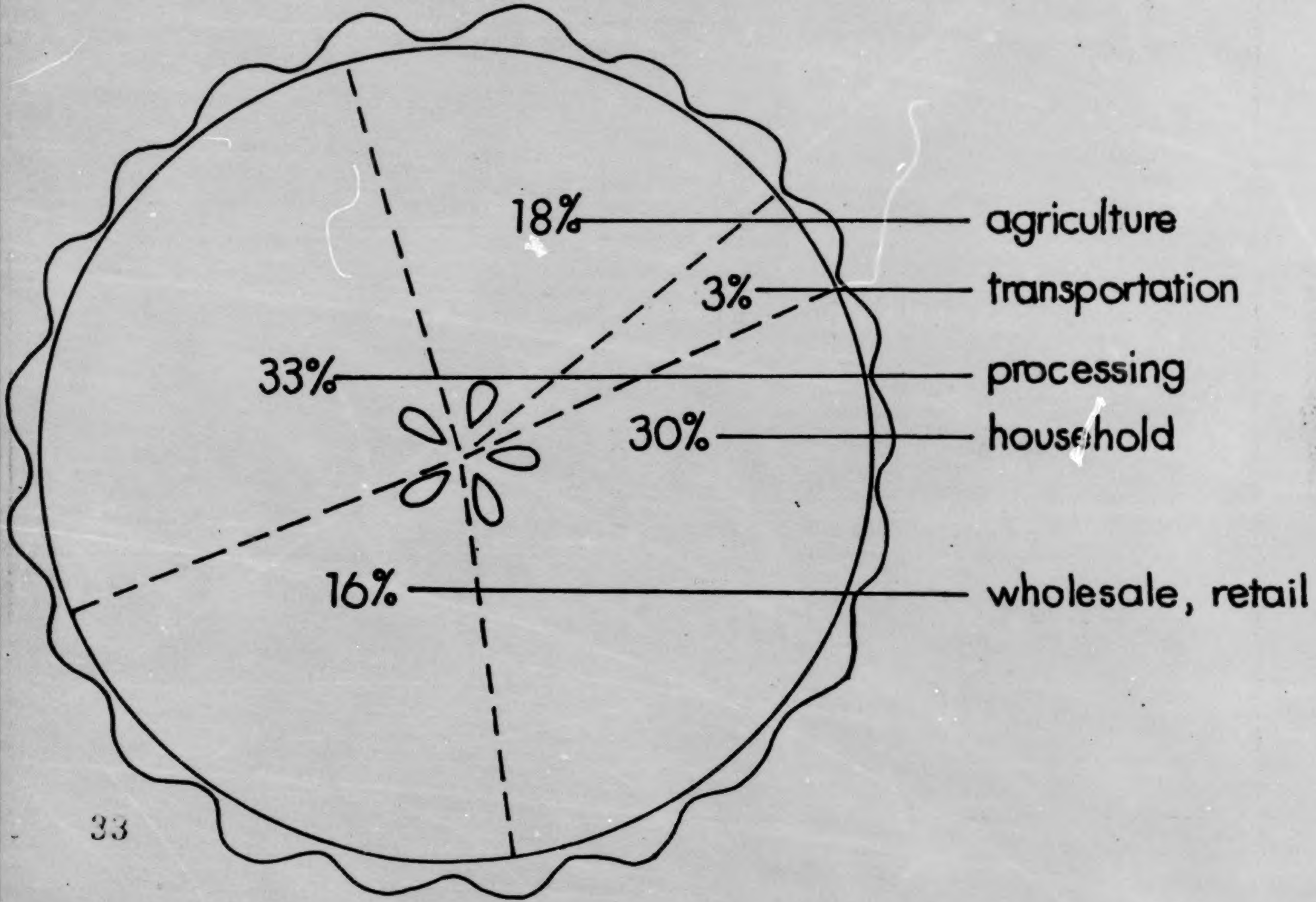
ENERGY MENU

	1 FIRST PREFERENCE	2 LEAST ENERGY	3 DIFFERENCES (+ or -)
APPETIZERS (CHOOSE ONE FROM EACH PAIR)			
Frozen Juice	__ $____	__ $____	__ $____
Fresh Juice	__ $____	__ $____	__ $____
Crackers (unwrapped, available to the restaurant in bulk)	__ $____	__ $____	__ $____
Crackers (wrapped individually, packed in small cartons)	__ $____	__ $____	__ $____
Butter	__ $____	__ $____	__ $____
Margarine	__ $____	__ $____	__ $____
MAIN DISH (PLEASE MAKE A FIRST AND SECOND CHOICE AS WE DO NOT ALWAYS CARRY EACH ENTREE)			
Luncheon Meat	__ $____	__ $____	__ $____
Chicken	__ $____	__ $____	__ $____
Turkey	__ $____	__ $____	__ $____
Rice with Vegetables	__ $____	__ $____	__ $____
Beef (Grass-Fed)	__ $____	__ $____	__ $____
Beef (Grain-Fed)	__ $____	__ $____	__ $____
VEGETABLE (SORRY, TODAY WE HAVE ONLY CARROTS, BUT YOU MAY CHOOSE YOUR PREFERRED TYPE)			
Fresh Carrots	__ $____	__ $____	__ $____
Dehydrated Carrots	__ $____	__ $____	__ $____
Frozen Carrots	__ $____	__ $____	__ $____
Canned Carrots	__ $____	__ $____	__ $____

assignment

	1 FIRST PREFERENCE	2 LEAST ENERGY	3 DIFFERENCES (+ or -)
DRINKS (PLEASE CHOOSE A FIRST AND SECOND CHOICE AS WE SOMETIMES RUN SHORT OF ONE KIND OF DRINK AT LUNCH)			
Soft Drink (in aluminum can)	$____	$____	$____
Soft Drink (in returnable glass bottle)	$____	$____	$____
Milk	$____	$____	$____
Beer (in aluminum can)	$____	$____	$____
Beer (in returnable glass bottle)	$____	$____	$____
DESSERT (CHOOSE ONE)			
Apples (homegrown in our restaurant's own garden)	$____	$____	$____
Apples (store-bought)	$____	$____	$____
Walnuts (shelled)	$____	$____	$____
Walnuts (unshelled)	$____	$____	$____
Ice Cream	$____	$____	$____
TOTAL BILL	$____	$____	$____

FOOD-RELATED ENERGY CONSUMPTION
(17% of All U.S. Energy Use)



unit of instruction:
Energy Conservation Related to
Food and Appliance Purchasing

subject area:
Foods and Nutrition

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

The students will recognize wise energy related choices when selecting foods and food related appliances.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to demonstrate the energy consumed for marketing trips and ways energy could be saved.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES FOR LEVEL I & II

Have the students complete the assignment sheet. Prepare to discuss the assignment in the context of the questions under evaluation.

EVALUATION TECHNIQUES

Have the students use the information from completed data sheets to answer the following questions:

1. Using the completed data form, do you see possibilities for energy savings?
2. Are there trips by car of less than half a mile in distance?
3. Could several trips have been combined into one?
4. Could shopping be done on the way to or from work or school?
5. Could marketing have been done closer to home?
6. Would carpooling for shopping with neighbors be a possibility?
7. What recommendations would you make to your family for ways to conserve energy when marketing?

Suggestion: Survey the students at large to determine how they travel from home to school and back. Discuss findings and recommendations in class

DEVELOPED BY

U. S. Department of Energy - Unit 6.1

background information

Few people realize the extent of the indirect use of energy to produce food - energy consumed in the manufacture of food-related equipment, manufacture and transportation of fertilizer, pesticides, and herbicides; manufacture, maintenance, and operation of farm equipment. The higher up the food chain, the more energy is consumed by the product. For example, beef cattle are more energy-intensive than vegetables, and man is more energy-intensive than cattle. In an energy conserving society, a conscious effort would be made to shift from animals raised on feed lots to animals raised on the range, from animal protein to vegetable protein; from meat, fish, poultry, eggs, milk and cheese to soy products, wheat germ, dry beans, peas and lentils.

The more direct energy costs of preserving, packaging and transporting food are the most obvious. Drying food to preserve it can require little energy, particularly if done by solar energy. Canning uses more energy than drying. Freezing requires even more energy, and energy must be continuously used during storage. To conserve energy, reduce the use of extensively processed foods. Of course, fresh foods eliminate the energy and cost of preservation.

A major source of energy waste is in packaging: Often more energy is embodied in the container than the food itself. One way to reduce this inefficiency is to cut down on disposable containers. Another is to purchase food in bulk. The most energy-intensive food items are in throw-away aluminum cans, plastic bottles, ready-to-heat frozen packages, and aerosol cans. The packaging makes a great deal of difference; for example, twice as much energy is required to produce a 6-ounce aerosol spray can of cooking oil as an equal amount of bottled cooking oil. The re-use of containers could yield a dramatic energy savings. The Environmental Protection Agency estimates that if 90 percent of the market used returnable beverage containers, the equivalent to 92,000 barrels of oil per day would be saved.

background information

Continued

The greatest single inefficiency in the food system is in transportation of food from the market to the home. The use of a two-ton vehicle - the family car - to transport 30 pounds of food several miles once a week is grossly inefficient. To conserve energy, shopping trips should be carefully planned. It is helpful to write menus for a few days or a week and then make a shopping list. Consult newspapers, radio and television for bargains. Since freeway driving is nearly twice as economical as driving in heavy city traffic, shopping trips should be carefully combined with commuting trips. Better yet, bike or walk to a store in your immediate area.

assignment

Marketing Trip Evaluation

The major factors involved in energy consumption for marketing are the number of trips, distance to the market and mode of transportation. To obtain a better perspective of your family's marketing practices, take a survey of the trips your family members make to market in a week, recording the distance and mode of travel. Distances can be obtained from a city or county map, the car odometer, or by estimation (one city block is about one-eighth of a mile).

Date	Time	Destination	Mode of Travel	Distance

unit of instruction:	**subject area:**	**suggested for:**
Energy Conservation Related to Food and Appliance Purchasing	Foods and Nutrition	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

Students demonstrate ability to make wise energy related consumer choices when selecting foods and food related appliances.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to demonstrate ability to select food packaging that is best for low energy consumption.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES FOR LEVEL I & II

The activity will investigate the energy used in packaging and compare that amount to the food energy in some packaged products. To keep the comparison equal, types of beverage containers will be compared for energy use in production.

1. Place the packaging materials on a table in front of the class. Discuss the reason for packaging. If time allows, have students mention some types of packaging they have used that day. Have the students guess the types of packaging (according to the number of kilowatt hours used in production of the packaging) from most energy used to least energy used. NOTE: If the term kilowatt hours is unfamiliar, explain that a watt is a form of energy measurement. Kilo means 1,000 in metrics, so kilowatt means 1,000 watts. If you leave 1,000 watts on for one hour, that is a kilowatt hour. An average blow-dryer uses 1,000 watts and can be used as an example.
2. Using "What's For Lunch?" (attached), have students vote which package took the most energy. Point out that the pop bottle and mason jar use the most energy.
3. Review all types of packaging from most energy used to least, as listed on the transparency. Then go back and decide whether they are recyclable, reusable, renewable or biodegradable. Each form of packaging has advantages and disadvantages.
4. Talk about the food energy inside each package.

EVALUATION TECHNIQUES

Key to Completion Test - See Attached

SUGGESTED MATERIALS AND RESOURCES

Gather packaging materials as listed. "What's For Lunch?" (attached)

DEVELOPED BY

Montana Power

background information

We value the convenience in our food system. Part of that convenience is having food packaged. Packaging keeps food clean and prevents the product from being damaged. Many federal laws require packaging for sanitation. Federal law requires individually packaged crackers and butter for restaurants, for example. Partly because of packaging, the United States has very few problems with food-related illnesses. Packaging makes food items easy to carry and use. Packaging sometimes keeps foods hot or cold. Packaging helps the storekeeper by making shelves easy to stock and maintain, making some products harder to steal (bubble packaging and cards on small items are examples of theft prevention packaging) and making products last longer. Packaging has greatly increased the length of time some products can be stored and helps cut food waste. Packaging is used as a form of advertising and it even serves us psychologically, making us feel that by using a product we can be glamorous, sexy or more desirable.

Americans have more packaging for their products than any other people. Petroleum products have expanded greatly the variety of packaging and reduced the cost. But packaging also comprises much of the waste in the food system. In some cases, the amount of energy going into package production alone is more than the food energy (in calories) contained in the food inside the package. (See FN 2-2).

Key to Completion Test

Petroleum and the Way You Live

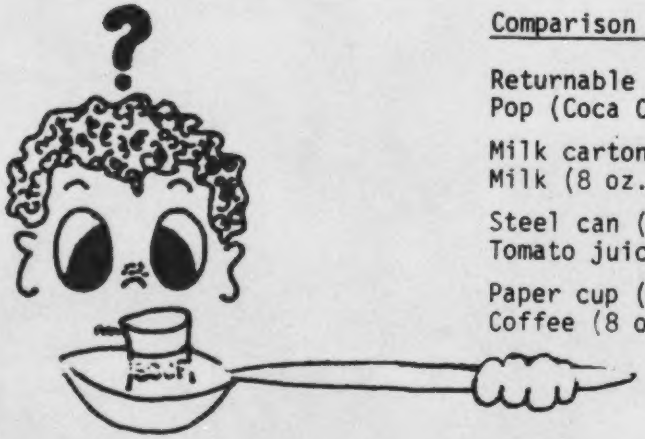
Sam Super, a seventh grader at O. K. Junior High, hated to get up one dreary, rainy day. Sam flicked on the electric lights and washed his hair with detergent shampoo. To cheer himself up, he put on his brightest plaid acrylic knit sweater. On the way downstairs, Sam passed his sister's room as she was fixing her new hairdo with her can of aerosol-propelled hairspray. Down in the kitchen, Sam's mother had fixed him some eggs in a teflon -coated pan, using her electric or natural gas range. Sam's mother complained that he ate too quickly from the colorful Melamine plasticware plate and insisted that, because it was raining, Sam wear his synthetic rubber or vinyl boots. All that hassle had given him a headache, so he gulped down an aspirin, grabbed his peanut butter sandwich wrapped in plastic wrap and banged the plexiglass storm door on the way out. On the way to the corner, Sam slipped in a puddle on the asphalt roadway. Finally, he climbed on the bus, powered by high octane gasoline. He sank back onto the vinyl -covered seat and unrolled a butterscotch drop from a cellophane wrapper, opened his synthetic leather notebook, and started his homework from the night before.

what's for lunch - the soup or the can?

Definitions: Kilowatt (KW) . . . . One thousand watts
Kilowatt hour (KWH) . . . . One thousand watts on for one hour
Food calorie . . . . 0.0011627 KWH; 860 calories = 1 KWH

Energy Cost of Beverage Containers

Container	KWH for Production	Renewable	Reusable	Biodegradable	Recyclable
Returnable pop bottle (8 oz.)					
Nonreturnable pop bottle (8 oz.)					
Milk carton (8 oz.)					
Steel can (8 oz.)					
Aluminum can (8 oz.)					
Polyvinylchloride bottle (8 oz.)					
Glass package (8 oz.)					
Paper cup (8 oz.)					
Styrofoam cup (8 oz.)					
Mason jar (8 oz.)					



Comparison of Kilowatt Hours Contained in Food vs. Package

Returnable pop bottle (8 oz.)	KWH
Pop (Coca Cola), (8 oz., 98 calories)	KWH
Milk carton (8 oz.)	KWH
Milk (8 oz., 160 calories)	KWH
Steel can (8 oz.)	KWH
Tomato juice (8 oz., 45 calories)	KWH
Paper cup (8 oz.)	KWH
Coffee (8 oz., 1 calorie)	KWH

Key to Completion

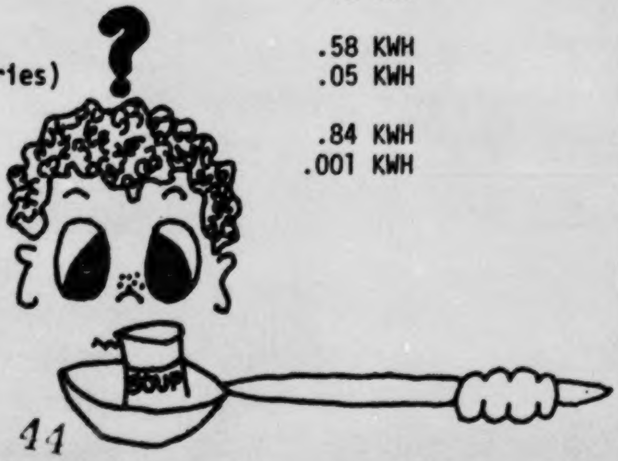
what's for lunch - the soup or the can?

Energy Cost of Beverage Containers

	KWH for Production	Renewable	Reusable	Biodegradable	Recyclable
Returnable pop bottle	1.42		X		X
Nonreturnable pop bottle	.85				X
Milk carton	.24	X		X	
Steel can	.58			X	X
Aluminum can	.16				X
Polyvinylchloride bottle	.80				
Glass package	.58				
Paper cup	.84	X		X	X
Styrofoam cup	.25				
Mason jar	1.42		X		X

Comparison of Kilowatt Hours Contained in Food vs. Package

Returnable pop bottle (8 oz.)	1.42 KWH
Pop (Coca Cola), (8 oz., 98 calories)	.10 KWH
Milk carton (8 oz.)	.24 KWH
Milk (8 oz., 160 calories)	.19 KWH
Steel can (8 oz.)	.58 KWH
Tomato juice (8 oz., 45 calories)	.05 KWH
Paper cup (8 oz.)	.84 KWH
Coffee (8 oz., 1 calorie)	.001 KWH



assignment

Petroleum and the Way You Live

Fill in the blanks in the following story from the list of words at the bottom of the page (all products made from petroleum). Each word will be used at least once. How many petroleum or petrochemical products can you think of that you used before school this morning?

Sam Super, a seventh grader at O. K. Junior High, hated to get up one dreary, rainy day. Sam flicked on the ____________ lights and washed his hair with _____________ shampoo. To cheer himself up, he put on his brightest plaid ________________ sweater. On the way downstairs, Sam passed his sister's room as she was fixing her new hairdo with her can of _____________________ hairspray. Down in the kitchen, Sam's mother had fixed him some eggs in a __________-coated pan, using her ___________________________ range. Sam's mother complained that he ate too quickly from the colorful _____________________ plate and insisted that, because it was raining, Sam wear his _____________________________ boots. All that hassle had given him a headache, so he gulped down an ___________, grabbed his peanut butter sandwich wrapped in ________________ and banged the ______________ storm door on the way out. On the way to the corner, Sam slipped in a puddle on the ___________ roadway. Finally, he climbed on the bus, powered by high octane ____________. He sank back onto the _________-covered seat and unrolled a butterscotch drop from a _____________ wrapper, opened his _____________________ notebook, and started his homework from the night before.

plexiglass
teflon
detergent
aerosol-propelled
asphalt

plastic wrap
gasoline
vinyl
acrylic knit
melamine plasticware
synthetic rubber

aspirin
electric
natural gas
synthetic leather
cellophane

unit of instruction:
Energy Conservation Related
to Food and Appliance Purchasing

subject area:
Food and Nutrition

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

Students recognize wise energy related consumer choices when selecting foods and food related appliances.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to explain how energy can be conserved through proper selection and use of appliances.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES

After reviewing energy materials related to appliance selection, students construct a check list of desirable qualities when selecting food related appliances.

Plan a field trip to an appliance store, etc. where students compare appliances by using their check lists.

EVALUATION TECHNIQUES

Student constructed check list.

Student's comparison of several brands of food related appliances.

SUGGESTED MATERIALS AND RESOURCES

Use/Care booklets involving food related appliances.

DEVELOPED BY

Energy & Man's Environment

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background information

The following information was provided by the Association of Home Appliance Manufacturers (AHAM), 20 North Wacker Drive, Chicago, Illinois 60606:

The Minimum Efficiency Level Program

The Energy Policy and Conservation Act was amended last fall (1978) by the National Energy Conservation Policy Act (NECPA). This amendment replaced a mandatory appliance efficiency improvement target program with a mandatory appliance minimum efficiency level program. The Department of Energy (DOE) is responsible for setting these levels.

What is a minimum efficiency level?

It is the lowest efficiency level an appliance can meet and still be sold in the United States. For example, let's say all combination refrigerator-freezers with automatic defrost systems now available to the consumer range in efficiency from 4 to 10 - with the highest number (10) being the most efficient. If the DOE decides to set the minimum or lowest allowable efficiency level at 8, any combination refrigerator-freezer with automatic defrost that is below 8 in efficiency cannot be sold in this country.

What appliances are affected by the minimum level program?

Congress considered these nine appliances to be significant energy users: refrigerators and combination refrigerator-freezers, freezers, clothes dryers, water heaters, room air conditioners, central air conditioners, kitchen ranges and ovens, portable space heaters and furnaces. They will be the first appliances to have minimum levels established.

When will the efficiency levels be established for these appliances?

The DOE is to set these levels no later than December, 1980. The agency plans to publish proposed levels by October of this year (1979).

What is the timetable for achieving these levels?

The law allows for the phasing in of these levels over a period of five years. It is AHAM's understanding that the DOE plans to use the full five-year period. Therefore, the deadline for meeting the

Continued

minimum efficiency levels will be December, 1985.

Will efficiency levels be set for any other appliances?

Yes, the DOE is also to establish minimum levels for dishwashers, television sets, clothes washers, humidifiers and dehumidifiers no later than December, 1981.

The Appliance Energy Labeling Program

The Federal Trade Commission (FTC) approved final rules for the appliance energy labeling program on June 28 (1979). The Commission plans to publish these rules in the Federal Register sometime in August (1979). Appliance manufacturers will then have six months to comply with the rules. Consumers can expect to see these labels on appliances in the stores in early 1980.

What appliances will be labeled?

Single door refrigerators, combination refrigerator-freezers, freezers, dishwashers, water heaters, clothes washers, air conditioners and furnaces.

What appliances will not be labeled?

Portable space heaters, television sets, kitchen ranges and ovens, clothes dryers, humidifiers and dehumidifiers.

Why are some appliances exempted from the labeling regulations?

The Federal Energy Law - the Energy Policy and Conservation Act - states that appliances do not have to be labeled if labeling is not "technologically or economically feasible" or if labeling will not help consumers make a purchasing decision.

The decision for exempting certain appliances was generally based on these three criteria:

1. The appliance cannot be improved in efficiency. Portable heaters, for example, are already 100% efficient. They use all the energy input as output in heat.

Continued

2. Models differ little in energy cost. Clothes dryers vary only about $4 to $5 yearly operating cost.
3. The total energy use of the appliance is so small that the annual operating cost is insignificant.

What will the labels look like?

The labels will have all information printed in black on yellow paper stock. Finished size will be 5 5/16 inches by 7 3/8 inches. Labels will be either adhesive or hang tags.

Where will the labels be located?

Generally speaking, labels will be on the upper right front corner of the appliance.

What energy information will be on the labels?

All labels will have the same heading in large, black letters - "ENERGY GUIDE." Climate-control appliances (furnaces and air conditioners) will have an EER (energy efficiency ratio) rating. The other appliances will be labeled with an estimated yearly operating cost. All labels will show the lowest to highest range of operating cost of EER rating for a certain product class. In addition, the labels giving operating costs will have a cost/use matrix to help consumers determine more closely their individual costs.

How is the EER determined?

The appliance model is rated according to federal test procedures for efficiency.

How is the operating cost determined?

The model is tested for energy consumption, again using federal test procedures. This consumption figure is then multiplied by the current average national utility rate. This rate is published periodically by the DOE.

background information

Continued

What other information is on the label?

The manufacturer or private labeler name, model number, capacity, a statement warning against removal of the label, and a statement indicating that the energy information is based on government tests.

Why isn't an operating cost figure used on the climate-control appliances?

FTC staff recognized that the energy used by these appliances depends a great deal on the "hours of operation" which, in turn, depends on geographical location and, therefore, a cost figure would be especially misleading and confusing to the consumer.

unit of instruction:	**subject area:**	**suggested for:**
Energy Expenditure in Food Storage	Foods and Nutrition	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

Students are able to compare varying food storage methods in relation to energy use.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to select and use the most energy efficient food storage methods in varying situations.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES FOR LEVEL I & II

1. Take two field trips to food processing plants. Note the energy steps used in production, preparation, storage, etc. Could the energy use be reduced? Have students write their evaluation of this. (Or view film, "Toast" obtained from Bullfrog Films).
2. Have students compare energy expenditure in various methods of food preservation and storage, using lab experiences.
3. Compare the purchase cost of one product (example: green beans), in the grocery store in four forms.. fresh, frozen, canned and dried (if applicable). Then compare energy used to store that product for one week.

EVALUATION TECHNIQUES

Observe students' ability to make wise food storage choices.

SUGGESTED MATERIALS AND RESOURCES

Pamphlets related to food preservation and storage methods.
Handout of food pyramid chart.

DEVELOPED BY

Americans for Energy Independence
U.S. Department of Energy

background information

The storage conditions for each kind of food must be correct so that the original quality is maintained. Some foods require freezer storage, some refrigerator storage, and others dry room temperature storage. If there is any spoilage, food, money and energy are wasted.

Ample space must be provided for each storage condition. Pantry storage requires little energy; however, refrigerator and freezer storage are energy-intensive. Refrigerators and food freezers run 24 hours a day. The energy required to preserve food follows third in line for home energy consumption behind (1) space cooling and heating, and (2) water heaters. Refrigerators and freezers give the third greatest opportunity to conserve energy in the home. Fortunately, refrigerators and freezers are available that use as little as half the energy that others do for little extra cost. Savings in smaller utility bills can make up the difference in purchase cost in the first year or two.

The use of refrigerators and freezers greatly affects their energy consumption. Cooling appliances should be located away from heating equipment and direct sunlight. The temperature controls should be properly set. Turn the control to the warmest setting which will keep food properly preserved. Use a thermometer to check the temperature; 0° F. for the freezer and 34-37° F. for the refrigerator are recommended. If a second refrigerator is used only during one season, unplug it for the balance of the year.

background information

Continued

Freezers and refrigerators operate most efficiently when filled to the correct capacity. However, do not overload the refrigerator as this will keep the compressor running more than it should. Food should be placed slightly apart on refrigerator shelves for correct circulation. The freezer should be kept as full as possible to prevent heavy icing. Cover all liquids stored in the refrigerator (especially frost-free models). Moisture is drawn into the air from uncovered liquids, making the refrigerator work harder.

Finally, unless a recipe requires quick chilling or freezing, let hot food cool slightly before placing it in the refrigerator or freezer. (Caution: Food may not be safe to eat if held for more than two hours at temperatures between 60° F. and 120° F.)

Open and close the refrigerator and freezer doors only when necessary. Several items can be removed at once to reduce loss of cold air. By keeping a list of the location of foods in the freezer, the freezer door can be kept open a minimum amount of time.

Maintenance of refrigerators and freezers also affects their efficiency. The gaskets around the doors should be kept in good condition. To check the gasket, close the door on a piece of paper. If it pulls out with no drag, the seal is bad and the gasket should be replaced. (This does not apply to magnetic seals). On self-defrosting refrigerators, keep the condensate drains cleaned. On all models keep condenser coils clean for maximum efficiency and conservation of energy. The dust attachment on the vacuum cleaner can be used to clean the condenser (located at either the bottom or rear of the unit). Dust on the condenser and coils causes the appliance to run longer. The freezer should be defrosted before frost becomes 1/4 inch thick to avoid wasting energy by overworking the compressor.

background information

Continued

Care should be taken to assure proper air circulation around refrigerator and freezer coils and compressor. As the unit's heat exchangers operate, the surrounding air is heated. Without proper circulation the air temperature around the exchanger becomes overheated and the efficiency of the unit is diminished. Under extreme conditions the compressor may "burn out". Refrigerators and freezers should not be placed in closets or small rooms with poor circulation. It is helpful to avoid placing the equipment in corners.

assignment

1. Ask the students to brainstorm and list all the steps involved in taking a tomato from seed to table, from your own garden, and from large-scale produce farming. Compare the results with the resource sheet. Visit a vegetable canning plant or frozen foods company to witness some of the steps.

2. Review with students all these steps for both ways of growing tomatoes using brainstorming techniques and small group discussion. Look for numbers of people and machines involved and for the types of fuel that might be used at each step, such as transportation, refrigeration, etc. Be sure you give sun, air, soil, human energy and water full credit!

   Serve a snack of cherry tomatoes and plant a seed or two.

3. Ask students how some steps can be eliminated. If you have a pick-your-own farm nearby, organize a field trip to visit it. Have students evaluate what happens to the list of steps when the potential buyer goes to the field to "pluck the ripe fruit". How far did you have to drive round-trip to the farm?

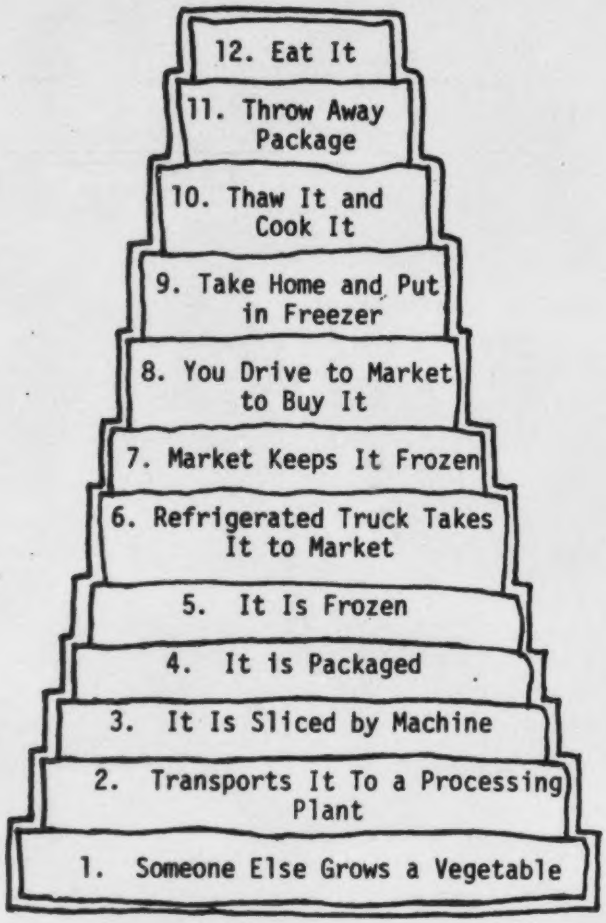
4. For an ambitious group project, try preserving the tomatoes. Have students keep track of the amount of time that the stove is working; the cost of lids, jars and ingredients; money spent; and hours of labor.

   Most people now eat frozen or canned vegetables instead of fresh ones, even in the summer. Attached is a list of the energy steps involved when we obtain and prepare frozen vegetables. Ask students how many steps can be saved by eating fresh vegetables.

assignment

Twelve steps in a food system are listed below for a frozen vegetable.

Which steps could be eliminated to save energy?


12. Eat It
11. Throw Away Package
10. Thaw It and Cook It
9. Take Home and Put in Freezer
8. You Drive to Market to Buy It
7. Market Keeps It Frozen
6. Refrigerated Truck Takes It to Market
5. It Is Frozen
4. It is Packaged
3. It Is Sliced by Machine
2. Transports It To a Processing Plant
1. Someone Else Grows a Vegetable

Construct the food chain steps for a canned soft drink and then make suggestions for steps which might be eliminated to save energy.

Suggestions: This type of visual representation makes a nice bulletin board display.

assignment

Possible Answers:

(a)

6. Eat It
5. Take It Home And Cook It
4. You Drive To Market and Buy It
3. Refrigerates It at the Market
2. Transports It to Market
1. Someone Else Grows A Vegetable

(b)

3. Eat It
2. Cook It
1. Grow a Vegetable In Your Own Garden

(c)

2. Eat It Raw
1. Grow a Vegetable In Your Own Garden

unit of instruction: Energy Used in Food Preparation

subject area: Foods and Nutrition

suggested for: Level I (Junior High)

UNIT OBJECTIVE

The student will be able to identify energy conservation methods in food preparation.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to determine the differences in food preparation techniques related to energy use.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES

1. Divide the class into two or more groups. Give each group the game sheets and allow time for researching and discussing if each idea on the sheet wastes or saves energy. Then the groups form lines (like a spelling bee) and read through the "wastes or saves" ideas one by one, alternating groups. The group that gives the most correct responses to the idea wins the game.

   Game sheet included.

2. Invite a representative from your local utility company to visit your class and discuss the merits of using microwave ovens vs. conventional ovens. Ask him or her to demonstrate the concept, if possible.

EVALUATION TECHNIQUES

Observe students' grasp of information by applying techniques during lab situations. Appoint an observer in each lab unit to use a check sheet to record specific instances of saving and/or wasting energy.

SUGGESTED MATERIALS AND RESOURCES

Game Sheet

DEVELOPED BY

Montana Power

background information

Home is a good place to make an impact in reducing energy use. Home food preparation accounts for almost 30 percent of the energy used in the food system. Major energy users in the kitchen are the oven and the refrigerator. Refrigerators vary in wattage requirements depending on size and features. Small, one-door, manually defrosted refrigerators require about 50 KWH per month to operate, while side-by-side refrigerator-freezers with automatic defrosting systems require up to 187 KWH per month. Although the automatic defrost system takes more energy, if a manually defrosted model is allowed to build frost, the manual defrost refrigerator may use as much energy as a frost-free model. To keep refrigerators energy efficient, vacuum the coils in the back regularly to remove dust. The seal around the door should be checked for leakage by closing a piece of paper in the door. If the paper pulls out easily, the seal should be replaced. (This does not apply to magnetic seals). Well-planned trips to the refrigerator eliminate holding the door open longer than necessary.

An electric oven needs about 3,700 watts and stove top units need from 1,200 watts for small units to 2,400 watts for large units. Self-cleaning ovens require alot of energy during the cleaning process, but are more efficient in everyday use because of increased insulation in the walls. Manually cleaned ovens should be kept clean for efficient operation. A dirty manually cleaned oven may use almost as much as a self-cleaning oven when the self-cleaning cycle is used regularly.

Small appliances, such as an electric skillet or toaster oven, are useful for preparing small amounts of food where an oven or range top wouldn't be used to its maximum. Appliances that have been purchased already should be used as much as possible because of lower wattages than stove tops or ovens, but buying a one-use appliance may be wasteful.

Microwave ovens can save energy when used correctly compared to electric ovens or stove tops. Microwave ovens work more efficiently when cooking four or less cups of food and when cooking foods containing small amounts of water (like vegetables rather than stews or soups).

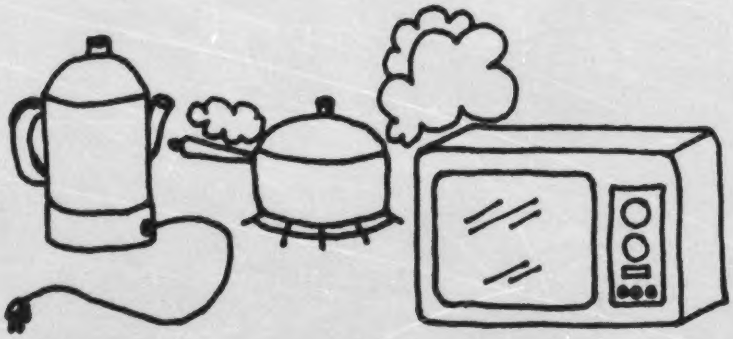
Student Material

assignment

FN 4-3

IF YOU... YOU WILL

	IF YOU...	WASTE	SAVE
1.	Plan menus to cut down on shopping trips,	________	________
2.	Decide what to eat while the refrigerator door is open,	________	________
3.	Rinse dishes under running hot water,	________	________
4.	Cover pans while cooking on stove,	________	________
5.	Have meals that require no cooking,	________	________
6.	Run the dishwasher with one-half load,	________	________
7.	Allow the refrigerator to build-up 2 inches of frost before defrosting,	________	________
8.	Cook more than one dish at a time in the oven,	________	________
9.	Run two full-sized freezers each one-half full,	________	________
10.	Use small appliances or the microwave oven, when possible, instead of oven,	________	________
11.	Use the oven to warm the kitchen,	________	________
12.	Check seals on the refrigerator to see that they are tight-fitting,	________	________
13.	Run the refrigerator with only the catsup and ½ jar of pickles in it while you're on vacation,	________	________
14.	Cook separate meals for each family member,	________	________
15.	Leave the coffee pot on all day,	________	________
16.	Use small pans on large burners,	________	________
17.	Vacuum the coils at the back of the refrigerator regularly,	________	________
18.	Keep the oven clean.	________	________



unit of instruction:
Energy Use in Food Preparation

subject area:
Foods and Nutrition

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

The student will be able to identify energy conservation methods in food preparation.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to use and maintain cooking appliances and to practice food preparation techniques which foster energy conservation.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES

1. Assign each student an appliance. Make 2 identical cards stating or picturing a tip for wise use of that appliance to conserve energy. Divide class into groups of 4. In each group have one student draw a picture of an energy wasting monster. Play like "Old Maid".

2. Have students construct a wall display related to energy saving use of kitchen appliances.

3. Conduct experiments comparing different food preparation techniques.

4. Plan, prepare and compare:

    a. an oven meal
    b. a pressure cooker meal
    c. a small appliance meal

EVALUATION TECHNIQUES

Written exam related to unit content information.

SUGGESTED MATERIALS AND RESOURCES

Cardboard to construct playing cards.
Energy Budget Manager

DEVELOPED BY

U. S. Department of Energy

background information

The preparation of food includes energy use for appliances to combat additional internal heat load and to heat water. Energy can be saved by the proper selection, use and maintenance of appliances and judicious preparation practices.

The major energy consumer for food preparation is the range, which ranks fourth after the heating/cooling system, water heater and refrigerator in home energy consumption. Other appliances used for food preparation (blenders, broilers, toasters, coffeemakers) use very little energy compared to the range. Therefore, the range offers the greatest opportunity to conserve.

The first consideration is the selection of a range. Ranges are relatively efficient appliances. Surface units on electric ranges are about 75 percent efficient and approximately 55 percent of all food preparation is done on surface units. Cooking inside the oven is generally a more efficient use of energy; since the heating is intermittent, much heat is retained within the oven walls and there is less convection loss. Due to the necessity for oven ventilation for good baking results, oven efficiency could be increased only minimally. However, self-cleaning ovens, because of their additional insulation, require less energy to operate than standard ovens. Also, microwave ovens are quite efficient for cooking certain types of foods. Although ranges do not now have energy consumption fact tags, they will be labeled in the near future just as air conditioners and refrigerators are. For the time being, the consumer must rely on reputable manufacturers and dealers when selecting cooking appliances.

In addition to efficiency and quality of the unit, the consumer

background information

Continued

should consider its appropriateness for the family's lifestyle. The use of over-sized units is very inefficient. Microwave ovens, toasters, coffeemakers, and other small appliances should be used when appropriate. There has been some question as to how much energy a microwave oven could save and tests of efficiency are being done now. Consumers Institute has found that microwaves offer the greatest energy savings in cooking small to medium quantities of concentrated foods such as meats, potatoes, desserts, and TV dinners, but their studies indicate some foods actually require more energy in a microwave oven than cooked conventionally. Some of the test results are given below:

Food Cooked in Microwave Oven	Energy Consumption
4 Baked Potatoes	60.7% less than ccm*
1 Frozen TV dinner (11½ oz.)	79.3% less than ccm
Casserole (4½ cups)	58.4% less than ccm
Summer Squash (16 oz.)	58.4% more than ccm
Peas and Celery (3½ cups)	46.1% more than ccm
Frozen Broccoli (10 oz.)	30.2% more than ccm

* ccm - conventional cooking method.

Gas range pilot lights have come under recent attack due to their energy consumption (1/3 to 1/2 of the total gas used by the range). However, in addition to providing a starter flame, pilot lights provide the safety shut-off system for the gas supply and a small amount of space heating in winter. Thus the issue isn't as simple as it might seem at first glance. For instance, if the gas were used to generate electricity, about two-thirds of its energy would be lost at the power plant alone. Appliance manufacturers are seeking to reduce the energy waste of pilot lights by using smaller flames. Also, electric ignition

background information

Continued

is currently available on at least some models produced by the majority of gas range manufacturers.

The key to the cost of operating cooking appliances is the way in which they are used. The consumer has the opportunity to exert a great deal of control over the energy consumption of the range, cooktop, or oven. First, cooking appliances should be used as they were intended:

HINTS FOR CONSERVATION

THE RANGE & OVEN

1. Don't use the range for heating the kitchen. This wastes a lot of energy since the range is not an efficient space heater. It is also dangerous!
2. Don't use the oven as a dryer. It is not economical and it can start a fire.
3. When cooking only small quantities, it is usually more economical to use small appliances rather than the range top or large oven. Toasters, waffle irons, skillets, grills, popcorn poppers, fondue pots, bean pots and coffeemakers use less energy for their specialized jobs than does the range. If you have both a small and large oven, use the small one whenever possible.
4. Preheating the oven is often unnecessary and may be a waste of energy. When preheating is required, or when baking time is only a few minutes, avoid preheating for longer than 10 minutes. Use a timer as a reminder that the oven is heated. Surface units should not be preheated. Put pots and pans on the range top before the heat is turned on to avoid wasting heat.
5. Don't be an oven peeker. Every time the oven door is opened during operation, the oven temperature drops 25 to 50 degrees. A range with an oven door window might be a good investment for the "peek-a-boo" cook.

Continued

background information

THE RANGE & OVEN

Continued

6. If food must be kept warm for extended periods, store it in an oven set no higher than 140° F. to 200° F. (Caution: Food may become contaminated if kept warm at temperatures below 140° F.) A food warmer built into the range usually requires less energy than the oven or surface unit when used for keeping food heated. Foods, plates and platters can be warmed with the stored heat remaining in an oven after baking with no additional energy use. A ceramic tile warmed while baking can be used to keep rolls hot during the meal instead of keeping the oven on or using an electric bun warmer.

7. Brown foods on medium high heat and then reduce to medium or low to finish cooking. This will reduce shrinkage and spattering and will consume less energy.

8. Use a timer with a loud bell to avoid overcooking and wasting energy.

9. Take advantage of the heat-sensing elements on gas and electric ranges to control the surface unit. It allows the unit to cut off the energy supply and coast occasionally while still cooking. Electric surface units can be shut off a short period (5 minutes or so) before the food is done. The food will continue to cook from stored energy.

10. Remember to turn off all units immediately after use. A warning light or buzzer is helpful as a reminder. Establish the habit of turning off the range before removing the utensil.

11. When cooking on top of the range, a vent fan can exhaust heated air directly to the outside and ease the burden on the home's cooling system. But, don't let it run needlessly.

The proper selection and use of cooking utensils can afford additional energy savings. The following considerations should be made:

UTENSILS

1. Pots and pans should fit the surface unit. The bottom should cover the heating element but not extend more than an inch over the edge. This will help minimize the amount of heat loss to the air. If the pot or pan is too large for the surface unit, it will heat unevenly and heat will

Continued

background information

Continued

UTENSILS

reflect down to the range top around the unit and eventually craze it.

2. To insure minimal heat loss from the pot or pan, it should have a flat bottom, straight sides and a tightly fitting cover. Good utensils allow less heat to escape and lower heat settings to be used. A pressure cooker can cut time and energy even more.

3. Ceramic, glass and stainless steel utensils retain heat better than other materials. When baking with these materials, the oven setting can be lowered 25 degrees.

4. Slightly lower temperatures can be selected when using teflon-lined utensils for frying or pan broiling on top of the range.

5. Use a tea kettle instead of a pan for heating or boiling water to avoid heat loss through steam.

6. Cover saucepans whenever possible. Food will cook faster and a lower temperature setting can be used. Be sure the lid fits tightly.

Care should be taken not to use energy for cooking appliances unnecessarily. Heating water and thawing foods are the most common causes for waste. The following tips can help avoid unnecessary energy use:

FOODS

1. When heating or boiling large quantities of water, start with hot tap water where a major part of the heating has already been done more efficiently by the water heater.

2. Large amounts of water use more energy and lessen the nutritional value of foods. Use only enough water to make steam and avoid sticking when cooking vegetables. The water will heat faster and conserve energy. Remember to reduce the temperature to simmer as soon as the steaming point is reached and use a pan with a tight lid. Vegetables will retain more vitamins and minerals and taste better.

3. Frozen foods require more energy than completely thawed foods whether cooked in the oven, under the broiler or on

Continued

background information

FOODS

Continued

top of the range. For example, a roast that has been defrosted requires 33 percent less cooking time than one that is still frozen. However, exercise caution to avoid bacterial growth.

4. Broiling meat is faster and more efficient than other methods.

Energy-conscious cooks schedule and plan for the most efficient use of their appliances. Cooking several items at the same time and choosing cooking times carefully can conserve energy. Following are suggested ways in which cooking might be better planned and scheduled:

METHODS

1. Sometimes it is more practical to cook several dishes at once instead of reheating the oven several times during the day. Two or three dishes can be baked with little more energy than one. For example, if three dishes are to be cooked at similar temperatures (325°, 350°, and 375°) pick the average temperature (350°) and cook all three, making a small allowance in cooking time. The oven (which is more efficient than the range top) can be used in this manner to prepare the entire meal.
2. Preparing multiple recipes for meals like spaghetti sauce, soups and stews that take a long time to cook can save energy. Then refrigerate or freeze for future use.
3. By dividing a skillet with foil inserts, several dishes can be prepared simultaneously.
4. When baking or cooking foods with extended cooking times, try to avoid "peak hours" (8-11 a.m. and 4-8 p.m. are usually the peak hours).

Proper maintenance of cooking appliances is also important, not only to conserve energy but also for safety. Clean appliances work more efficiently, more safely, and certainly more hygienically. Proper inspection of equipment will help insure efficient operation. The following steps should be taken to maintain the efficiency of cooking appliances:

background information

MAINTENANCE

Continued

1. Keep heat reflection surfaces clean, especially the reflectors below the heating element on top of the range and the entire oven.

2. For the most efficient use of fuel, gas burners should have a steady blue flame. A yellow flame means it needs adjustment or cleaning.

3. Make sure the pilot on a gas range is properly adjusted. It may be using more fuel than necessary.

4. Have faulty switches, burners and thermostats fixed promptly and professionally. Check the oven thermostat every six months with a thermometer.

5. Make sure oven door seals are tight and not leaking heated air.

6. Air filters on exhaust fans must be cleaned periodically to work effectively and efficiently.

unit of instruction:	subject area:	suggested for:
Energy Use in Food Preparation	Foods and Nutrition	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

The student will be able to identify energy conservation methods in food preparation.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to demonstrate the energy consumption differences of conventional and microwave ovens.

BACKGROUND INFORMATION

Refer to previous activity (FN 4-4 thru FN 4-11) where more detailed information is available.

SUGGESTED ACTIVITIES

A microwave oven has the capability of saving energy as a result of the short cooking time needed for some foods. However, many foods may still be more efficiently cooked in a conventional oven.

In the home economics laboratory, compare the energy required to cook the following food items: cake, tuna casserole, frozen TV dinner, frozen broccoli, and baked potatoes. To determine the energy used to cook each item, calculate the energy used in kilowatt-hours. This can be done by first determining the wattage of the cooking unit (listed on the appliance):

__________ watts for microwave oven (usually around 1,450 watts)

__________ watts for conventional oven (usually around 12,200 watts)

Then determine the amount of time the unit operates to cook the food item. The operation time of the microwave oven will be easy to determine since it operates continuously and is usually equipped with a timer. The operation time of the conventional oven will be more difficult to determine since pre-heat time must be included and a conventional oven does not operate continuously. A stop-watch will be needed to determine the operation time. You must time each interval that the oven is operating (most ovens are equipped with a light which indicates when the oven is operating) and add them to arrive at the total time of operation required to cook the food item.

Once the wattage and cooking times are determined, the energy use can be calculated.

Continued

For example: If a cup of squash requires 30 minutes to cook in a 12,000 watt oven, it requires 6 kilowatt-hours of energy:

$$\underline{12,000} \text{ watts} \times \underline{30} \text{ minutes} \times \frac{1^*}{60,000} = \underline{6} \text{ kilowatt-hours}$$

* (The conversion factor is $\frac{1}{60,000}$ since there are 1000 watts to a kilowatt and 60 minutes to an hour.)

EVALUATION TECHNIQUES

Evaluate students' selection of cooking appliance during lab situation.

SUGGESTED MATERIALS AND RESOURCES

Worksheets
Stop-Watch

DEVELOPED BY

U. S. Department of Energy

assignment

CAKE (Use the same recipe in each oven)

Conventional Oven:

________ watts x ________ minutes x $\frac{1}{60,000}$ = ________ kilowatt-hour.

Microwave Oven:

________ watts x ________ minutes x $\frac{1}{60,000}$ = ________ kilowatt-hour.

TUNA CASSEROLE

Conventional Oven:

________ watts x ________ minutes x $\frac{1}{60,000}$ = ________ kilowatt-hour.

Microwave Oven:

________ watts x ________ minutes x $\frac{1}{60,000}$ = ________ kilowatt-hour.

FROZEN TV DINNER

Conventional Oven:

________ watts x ________ minutes x $\frac{1}{60,000}$ = ________ kilowatt-hour.

Microwave Oven:

________ watts x ________ minutes x $\frac{1}{60,000}$ = ________ kilowatt-hour.

FROZEN BROCCOLI

Conventional Oven:

________ watts x ________ minutes x $\frac{1}{60,000}$ = ________ kilowatt-hour.

Microwave Oven:

________ watts x ________ minutes x $\frac{1}{60,000}$ = ________ kilowatt-hour.

FOUR BAKED POTATOES

Conventional Oven:

________ watts x ________ minutes x $\frac{1}{60,000}$ = ________ kilowatt-hour.

Microwave Oven:

________ watts x ________ minutes x $\frac{1}{60,000}$ = ________ kilowatt-hour.

Tabulate Your Results

Food Item	Energy Used by Conventional Oven	Energy Used by Microwave Oven
CAKE	_______ kilowatt-hour	_______ kilowatt-hour
TUNA CASSEROLE	_______ kilowatt-hour	_______ kilowatt-hour
TV DINNER	_______ kilowatt-hour	_______ kilowatt-hour
FROZEN BROCCOLI	_______ kilowatt-hour	_______ kilowatt-hour
BAKED POTATOES	_______ kilowatt-hour	_______ kilowatt-hour

Suggestions:

1. Remember that the quantities and types of foods cooked in the ovens must be the same to provide valid comparisons.
2. What would have been the effect on energy consumption if more than one food was cooked in the oven at once? Would this method of conserving energy be more effective for conventional or microwave ovens?
3. You may wish to choose different foods to test. If so, try to select a range of items from "dense" (such as meat) to "much less dense" (such as squash) to provide dramatic results.

Students prepare a variety of foods in lab using conventional and microwave ovens.

unit of instruction:
Energy Use in Food Preparation

subject area:
Foods and Nutrition

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

The student will be able to identify energy conservation methods in food preparation.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to determine the necessity of pre-heating ovens in different types of food preparation.

BACKGROUND INFORMATION

Recent studies have shown that large amounts of energy are lost in pre-heating ovens. Slight differences in products result when ovens are not pre-heated. Normal differences can be overcome by extending baking time by several minutes. (For further information, contact Pacific Gas and Electric Company - 77 Beale Street - San Francisco, California 94106).

There are, however, certain food items that must be baked in a pre-heated oven. Examples of these are popovers, cream puffs, angel food cake and souffles.

SUGGESTED ACTIVITIES

Using muffins, have students bake with pre-heated ovens and also with ovens that have not been pre-heated. After removing from ovens, evaluate finished products.

EVALUATION TECHNIQUES

Use of experiment results in lab situations.

unit of instruction:	**subject area:**	**suggested for:**
Energy Use in Food Preparation	Foods and Nutrition	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

The student will be able to identify energy conservation methods in food preparation.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to plan and prepare an oven meal and be aware of savings in energy.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES

1. Students prepare bulletin board with pictures of parts of a menu which are totally prepared in the oven.
2. Students plan and prepare a complete oven meal.
3. Class discussion of energy uses related to various means of preparing foods.

   Example: Energy consumption in frying, baking, broiling, etc. (refer to KWH chart)

EVALUATION TECHNIQUES

Evaluate student choices in laboratory experiences in menu items as it relates to energy.

SUGGESTED MATERIALS AND RESOURCES

Magazines containing pictures of food
Women's Day Magazine, January 23, 1979, contains a "Collector's Cookbook" of energy saving recipes.

DEVELOPED BY

Public Service Company of Colorado

background information

Oven meals are perfect for several reasons:

1. There's no pot-watching involved.
2. If you are having company, your meal can be timed to the split second to have everything done and ready for serving at the same time.
3. Oven meals can include everything from the meat to vegetables to bread and/or dessert.
4. Best of all, oven meals save gas or electric energy.

Energy Saving Oven Tips

1. Pre-heat oven only when necessary for a specific recipe (most cakes, biscuits, cookies, souffles) and just long enough to reach required temperature. Many casseroles, meats, yeast breads and vegetables may be started in a cold oven. Follow directions in range's use-and-care manual.
2. Do not open oven door unnecessarily. Use timer to remind you when to add or remove other foods or check for doneness.
3. Use shallow baking dishes for faster heat penetration.
4. Turn off oven several minutes before estimated cooking time, leaving food to finish baking. Do not open oven door.
5. If oven has self-cleaning feature, turn it on after roasting or baking to take advantage of heat already in oven.
6. Place foods to be browned on upper rack.
7. Arrange pans so they do not touch each other and so that one pan is not directly above another.
8. Special recipes are not necessary. Choose foods which cook at the same temperature and time, if possible. If one dish cooks for a shorter period of time, simply put it in the oven later.

background information

Continued

9. Vegetables best suited for oven cooking are potatoes, carrots, beets, turnips, parsnips, onions, squash and corn. Use a pan or casserole dish with a light-fitting lid and add 1/4 to 1/2 cup of water and seasoning.
10. Brown less tender cuts of meat in skillet, then place in covered utensil and add 1/4 to 1/2 cup water.

Energy Saving Appliances

1. Pressure cooker reduces cooking time of long-cooking foods considerably - sometimes by more than half.
2. Toaster oven can save energy when cooking for 1 or 2, avoiding the need to heat up larger oven. (Use top of toaster to warm plates and keep other foods warm.)
3. Slow cooker uses minimal energy for long-cooking food.
4. Electric skillet: Large ones and those with dome lids are especially good for full-meal cooking.
5. Electric fryers and cook-and-serve electric appliances are now available in small sizes; use less energy.
6. Microwave oven cuts cooking time of many foods to mere minutes; is especially quick and convenient for heating frozen foods.

unit of instruction:
Energy Use in Food Preparation

subject area:
Foods and Nutrition

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

Students will be able to identify energy conservation methods in food preparation.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to plan and prepare a meal and be aware of savings in energy.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES

1. Students are given one week's dinner menus. They then evaluate what small appliances could be used in preparing the menus, so they will be energy efficient.
2. Adjust menus to use appliance which is most energy efficient. Example: Serve baked potatoes as opposed to whipped potatoes when the oven must be heated for the main dish.
3. Students select and prepare main dishes using small appliances or pressure cooker.

EVALUATION TECHNIQUES

Teacher examines student activities to determine ability to apply concepts learned.

SUGGESTED MATERIALS AND RESOURCES

Typical daily menus

ADAPTED FROM

Americans for Energy Independence, 1629 K. Street, N.W.,
Washington, D.C. 20006

unit of instruction:
Energy Use in Kitchen Cleanup

subject area:
Foods and Nutrition

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

Students should be able to select the most energy efficient methods of cleanup of kitchen activities.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to identify energy consumption for food cleanup activities and to practice food cleanup techniques which foster energy conservation.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES

1. Before reviewing information provided, students brainstorm for energy saving cleanup tips.
2. Small group of students role-play cleanup situations while remainder of class notes incorrect procedures. (Actors are informed to include incorrect methods.)
3. Students make mobile with cleanup hints to display in kitchen area.

EVALUATION TECHNIQUES

Improved procedure in use of cleanup techniques during lab.

SUGGESTED MATERIALS AND RESOURCES

Construction paper, markers, art materials.

DEVELOPED BY

U. S. Department of Energy

background information

The cleanup activities for food include disposal of food material, cleaning of appliances and washing of dishes and utensils. These activities involve the use of energy directly and indirectly. The use of appliances such as dishwashers, food disposals and trash compactors involves the direct use of electricity. However, the use of hot water involves the indirect use of energy to heat the water.

There has been a great deal of controversy as to which cleaning technique requires more energy - hand-washing or dishwasher. There is no simple answer. The energy involved in hand-washing is for hot water, generally 15 gallons per day and to combat the increase on the house's cooling system created by the heat from the hot water.

Dishwashers use energy in four ways: Circulate the water; heat the water and dry the dishes; consume hot water; and combat the increased internal heat load on hot days. Dishwashers vary in efficiency and the quantity of hot water required. At present, manufacturers are not required to label dishwashers as to their energy efficiency but may in the near future. Their hot water consumption varies from 5 to 15 gallons per load. Check the manufacturer's label for voluntary energy and hot water consumption information before buying a dishwasher. Consumer practices also have a great effect on the energy consumption for dishwashing. When using an automatic dishwasher, the following practices will help conserve energy:

1. Accumulate dishes until the dishwasher is full before washing to avoid fuel, hot water and detergent waste. Be careful not to overload the unit or block the circulation of water. Consult the operation manual.
2. Scrape dishes but do not rinse them before loading the dishwasher. If rinsing is necessary, use cold water.

background information

Continued

3. Use only dishwasher detergents. Other cleaning agents can block the washing action, causing overflow and requiring a second wash cycle. Also, use the proper quantity of detergent.

4. Partial load cycles, rinse-only cycles, mid-cycle turnoff and other special features are designed for energy conservation as well as convenience. One modification, a dishwasher power-saver switch, can cut off approximately 8 percent of the total energy consumption (both hot water and operational energy).

5. Dishwasher drains and filters must be kept clear of debris so as not to reduce efficiency or cause overflow.

6. Dishwasher energy consumption can be reduced by about one-third by turning off the dishwasher after the final rinse and before the drying cycle. Let the dishes air dry. After the final rinse, turn off the control knob of the dishwasher and open the door.

7. Don't use the dishwasher as a plate warmer.

8. On hot days use the dishwasher at night or in the very early morning to avoid extra heat in the house during the day. Automatic timers may be attached to the dishwasher to avoid "peak load" operation (usually 4-8 p.m.) and thus to help the electric utility in its problem of meeting peak demand.

When washing dishes by hand, the following practices will help conserve energy:

1. Use two containers, one for washing and another for rinsing, to avoid an excessive use of hot water.

2. Avoid washing dishes after each meal. Rinse dishes off with cold water and collect them until a sufficient number to warrant a full load is gathered.

3. Allow dishes to drain dry rather than drying with a towel (air-dried dishes are more germ-free than those dried with a towel) and avoid adding dish towels to the laundry (and energy) load.

The use of compactors and food disposers requires little electrical energy and conserve energy over other methods of waste disposal. Compactors save municipal collection costs and the energy required for waste handling; food disposals may also save energy over other methods of waste disposal.

unit of instruction:	**subject area:**	**suggested for:**
Energy Use in Kitchen Cleanup	Foods and Nutrition	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

Students should be able to select the most energy efficient methods of cleanup of kitchen activities.

SPECIFIC OBJECTIVES

Given the opportunity to identify disposable items, the student will be able to identify the significance and possibilities of recycling.

BACKGROUND INFORMATION

Kitchen waste disposal includes handling debris from food preparation, table left-overs, food saved but later thrown away and the continual disposal of cans, aluminum foil, paper towels, empty boxes and other refuse.

From a national energy conservation viewpoint, we can help by saving and recycling our empty aluminum cans and glass bottles.

If we are able to have our own gardens, most of the organic kitchen wastes can go on the mulch pile for eventual use as fertilizer.

SUGGESTED ACTIVITIES

1. Discuss with the class the abundance of disposable or throw away items available to the consumer.

2. Have each student bring to class items from home which are classed as disposable.

3. Construct a bulletin board of all these items. (A collage arrangement is very effective.)

4. When the board is completed, have each student identify the items and identify the energy source and material (resources) which were used in the item's manufacture.

5. Compare lists in class and correct all mistakes. Now have each student suggest a possible alternative for the items listed.

6. Discuss the recycling possibilities and the rationale for recycling.

EVALUATION TECHNIQUES

Each student brings to class an item that has been recycled and explains its use.

Foods and Nutrition Resources

American Gas Association, A Consumer's Guide to Energy Conservation with Natural Gas, Arlington, Virginia: American Gas Association, (n.d.).

American Gas Association, Money to Burn, Arlington, Virginia: American Gas Association, (n.d.).

Association of Home Appliance Manufacturers, Facts on Energy Use and Conservation for Refrigerator-Freezers, Chicago: AHAM, 1974.

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Butel, Jane, Saving Electricity with Household Appliances, The Journal of Home Economics, November 1975, pp. 20-22.

Federal Energy Administration, Energy Use in the Food System, Washington, D.C.: Government Printing Office, 1975.

Federal Energy Administration, Tips for Energy Savers, Pueblo Colorado: Consumer Information (n.d.) (also available in Spanish).

Federal Energy Administration, Tips for Energy Savers In and Around the Home, On the Road, In the Marketplace, Washington, D.C.: Government Printing Office, 1975.

Fritsch, Albert J. and others, Energy and Food, Washington, D.C.: Center for Science in the Public Interest, 1975.

Hirst, Eric, Energy Use for Food in the United States, ORNL-NSF-EP-57, Oak Ridge, Tennessee: Oak Ridge National Laboratory, 1973.

Katz, Deborah, and Mary T. Goodwin, Food: Where Nutrition, Politics and Culture Meet, Washington, D.C.: Center for Science in the Public Interest, 1976.

Office of Consumer Affairs, Consumer Register, Washington, D.C.: Government Printing Office.

U.S. Department of Commerce, Home Energy Saving Tips from NBS, Pueblo, Colorado: Public Documents Distribution Center (n.d.).

Vragel, Kurt, How to Save Energy in Your Home, Denver: Kurt Vragel Associates, Inc., 1975.

Knowing Your Home Appliance, from Porcelain Enamel Institute, 1900 "L" Street, N.W., Washington, D.C. 20036.

Americans for Energy Independence, 1629 "K" Street, N.W., 12th Floor, Washington, D.C. 20006.

Oven Meals for Any Hour, Harper-Wyman Company, 930 N. York Road, Hinsdale, Illinois 60521

Utility Company pamphlets such as: Slow Cooker Recipes
Your Energy Budget Manager
A Buyer's Guide to Portable Microwave Ovens
Food Drying Recipes

Facts About Food Freezing

The Electric Range

A Consumer's Guide to Portable Appliances

State Extension Agency: Drying Fruits and Vegetables
Small Appliance Pamphlets

INDEX

Section - Energy Awareness in Clothing and Textiles

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Unit VII. - Personal Care

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unit of instruction:
Clothing Selection

subject area:
Energy Awareness in
Clothing and Textiles

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

To develop an awareness for the importance of energy conservation in clothing selection and care.

SPECIFIC OBJECTIVE

After completion of this unit, the student will be able to:

1. List ten ways of saving energy in selection and care of clothing.
2. Demonstrate to the class, energy saving techniques through oral and written presentations.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES

Activity I (Level I & II) - Energy awareness in clothing selection and maintenance.
Summarize the ideas listed in the background information. Brainstorm the ideas in small groups and develop a bulletin board or display to share the basic concepts. Every two weeks a new group puts their ideas up on board or in case. Have individual class members evaluate based on accuracy of message conveyed, originality and attractiveness.

Activity II (Level I & II) - Below level reading ability student (approximately 2nd grade reading level).
A. Have the students read "Save Energy" booklet - Suggested Materials and Resources page CT 1-3 - and discuss the following questions:

P. 2-3 What is energy? Why is it important to save energy?

P. 7 Dress right - cut down washer/dryer use; use cold water whenever possible.

P. 14 Save energy when you shop - six ideas.

B. Draw a cartoon showing one way of saving energy in the home.

-continued-

Activity III (Level II) - Encourage the gifted and talented student in all areas of energy conservation. Student may be able to correlate a project with another class; i.e., science or math computation, chart or graph work. Have the student plan an individualized approach.

A. Have students do comparison test on textile finishes related to the energy used in care.

B. Have the students research and report on special clothing needs, especially layering for handicapped or elderly to allow them to reduce a high thermostat setting at home.

Activity IV (Level I & II) - Have students interview their parents and grandparents to find out how they used, or did not use, electricity in selecting, caring for and constructing their clothes and in grooming.

Activity V (Level II) - A. Teacher contact a local electronics store, i.e., Radio Shack or educational sales company to arrange a demonstration of the home computer.

B. Home computers are a storehouse of information. Have the class brainstorm ideas on uses of a home computer. Present information and pictures on a home computer. Divide the class into two groups to discuss:

a. How could a device such as a home computer help an individual or family plan for:

Wardrobe addition?
Sewing?
Recycling?
Purchasing?
Heating/Cooling Controls?

b. How could the home computer aid in the decision about what fabric to buy for a particular project?

Cost
Fiber Content
Durability
Appropriateness
Energy Saving Care

unit of instruction:
Clothing Selection

subject area:
Energy Awareness in
Clothing and Textiles

suggested for:
Level I (Junior High)
Level II (Senior High)

-continued-

EVALUATION TECHNIQUES

After completion of assignments, students will be to evaluate energy saving techniques in clothing selection, care, construction and grooming.

SUGGESTED MATERIALS AND RESOURCES

A microcomputer "Compucolor II", portable and self-contained, size of portable TV - $1495 - available in local computer store or contact: Compucolor Corporation, P.O.Box 569, Norcross, Georgia 30071; phone: (404) 449-5996. Advertisement in April/May 1979 Today's Education NEA

"Textiles and Energy" Journal of Home Economics May 1978

Booklet "Save Energy" (No. C967-1534) 1-24 copies 75¢ each, 25-99 copies 50¢ each, 100-499 copies 25¢ each. Scriptographic style - combination of key words - every page has suggestions on how to conserve energy - easy to read and understand. Order from: Channing L. Bete Co., Inc., 45 Federal Street, Greenfield, Massachusetts 01301.

DEVELOPED BY

Annie Adkisson
Mary Jo Bruskiewicz

background information

Ways to Save Energy

Clothing Selection

- Do not let the temperature drop below 65° F. (18.3° C.) in winter if there are infants or elderly in the home. There is danger of hypothermia (chilling that produces a low body temperature), which is dangerous for the very young and the very old and can be fatal.

- Wear heavy underclothes, heavier outer clothing, sweaters, smocks, and "layers". Use extra socks and be sure to keep the head covered.

- Wear less clothing. Our body temperatures adjust accordingly.

- Garment style is an important consideration. Still air acts as an insulator, keeping body heat in. To dress coolly, choose a garment that does not keep air spaces near the body. The openings at the neck, waist, wrists and ankles should be large so that air can circulate and carry heat away from your body as you move.

- Color plays both a real and an illusory part in how we feel. Light colors, which actually reflect the sun's rays, give a cooling effect.

- Wearing a skirt will usually make a woman cooler than if she wore slacks.

- Fibers that absorb moisture and allow perspiration to evaporate from the skin (for example, cotton) are usually more comfortable to wear. Natural fibers do this well. Man-made fibers (except for rayon) do not absorb moisture.

- New finishes are now being developed that allow man-made fibers to absorb moisture. Look for them.

- Accessories add warmth. Eliminate some of them in warmer weather.

- Wearing sandals instead of heavier shoes will keep you cooler.

- Choose open-weave fabrics that breathe.

- If men abandon their T-shirts for the summer, they will be cooler. They should wear a short-sleeved shirt and omit a tie if possible.

- Women should look for pantyhose with a cotton crotch and an open weave. On the hottest days, women could omit hose.

- Try to use cotton and woolen materials for clothing and furnishings, as they require less energy for processing. (However, maintaining natural fibers may require more ironing and other energy-consuming care).

background information

-continued-

- Consider indirect as well as direct energy costs when buying and using goods and services. The energy required to manufacture goods and services accounts for half or more of that used in a single-family house. Use fewer throw-away articles. Do not discard workable or repairable appliances just to change style or color.

Clothing Care

- Save your clothes dryer for bulky items. Do not use dryer for shirts, blouses, pants, dresses, bathrobes and similar clothing. Remove them from the washer as soon as it stops and put them on clothes hangers. A clothes line next to the washer is a handy place to put nylon clothing that dries in an hour or so.

- Do only full loads in the washing machine - with as little hot water as possible - and in the dishwasher.

- Take quick showers instead of tub baths. Shower as if the water is nearly exhausted. Wet yourself, turn off the water, soap yourself, then turn on the water for a rinse. Some residents of Western United States have been doing it this way for years.

- Use outside clothesline ("solar dryers") to dry your clothes.

- Eliminate gadgets that require kilowatt energy. Use more "elbow grease".

- Be just as energy-saving at work, shopping or in a motel. Wasting energy costs us all more eventually.

- Keep the filter of your clothes dryer clean.

Adapted from:
"100 Ways to Save Energy"
Journal of Home Economics, Marjorie S. Stewart and Willodean D. Moss
May, 1978, p. 33-36
Copywrite: American Home Economics Association

unit of instruction:	**subject area:**	**suggested for:**
Clothing Selection Classic Fashions vs. Fads	Energy Awareness in Clothing and Textiles	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

To determine wise clothing selections and recognize choices and practices of clothing care that are energy wasting and energy conserving.

To be aware of energy efficient decisions in a wardrobe planning unit.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Distinguish between classic fashions and fads, and
2. Develop a wardrobe plan which reflects their energy knowledge and awareness.

BACKGROUND INFORMATION

Energy conscious consumers recognize the importance of choosing classic fashions instead of fads. Classic fashions are energy conserving because the garments remain in style and can be worn for a long period of time. Fads are energy wasting because generally the garment is seasonal and when the garment is discarded, the fabric may not be recycled and additional energy is used in sewing or buying a new garment.

SUGGESTED ACTIVITIES

Level I - Using pictures from magazines, catalogues, pattern books, etc., make a collage of garments and accessories that are classics and fads. Find five examples of a classic and five examples of a fad and label each picture used.

Level II- a. Have several highly motivated students prepare a demonstration showing use in the wardrobe of a classic fashion - skirt, vest, blazer - as compared to a current fad. Emphasize selection of garments that are multi-purpose and practical.

b. Students could analyze their wardrobes and inventory the items they consider to be "classic" and "fad". Determine what classic items could be added to extend wardrobe either for school, work or leisure time activities.

EVALUATION TECHNIQUES

After completion of making a collage and demonstrating differences between classic fashions and fads, students will be able to make energy efficient decisions in wardrobe selections.

DEVELOPED BY
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unit of instruction:
Clothing Selection
Layering

subject area:
Energy Awareness in
Clothing and Textiles

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

To determine wise clothing selections and recognize choices and practices of clothing care that are energy wasting and energy conserving.

To be aware of energy efficient decisions in a wardrobe planning unit.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

Select clothing that will either insulate against the cold or during warmer weather, provide for air to circulate and perspiration to evaporate.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES

Level I - Using pictures from magazines, catalogues, pattern books, etc., ask the students to make a collage of accessories that:

a. Add warmth to a school outfit.

b. Can be removed from a school outfit to make the body cooler.

Level II - Invite a guest speaker from a department store to demonstrate use of accessories that will add warmth or be removed to make the body cooler.

EVALUATION TECHNIQUES

After completion of activities, students will be able to select wardrobe accessories which could add warmth or be removed for coolness.

DEVELOPED BY

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background information

Clothing can act as insulation for the body by keeping a layer of warmth around it or as an air conditioner, allowing the body to cool itself by the evaporation of perspiration. During cool periods, clothing should be selected for its insulative value. Bulky fabrics (such as knit fabrics, hairy fabrics, or napped fabrics) have a great deal of air trapped within their structures which acts as insulation to keep body heat in and cool air out. Fibers such as wool or kinked synthetics are better for cold weather than smooth filament fibers, such as filament nylon or polyester, because they don't pack down and lie flat, eliminating air. The moisture content of wool also aids the feeling of warmth. Wool absorbs more moisture than synthetics or other natural fibers, and in doing so releases heat and feels warmer.

During warm periods, clothing that permits air to circulate and perspiration to evaporate is desired. Lightweight, loosely woven fabrics and clothing that fits loosely and has a minimum of layers provide for the best circulation of air. Cotton is an excellent fiber for warm weather clothing since it can be loosely woven in thin layers and has the ability to absorb perspiration from the body and pass it to the surrounding air. Most synthetics are poor moisture absorbers. Light-colored clothing also contributes to warm weather comfort by reflecting heat and solar radiation.

Air conditioning and heating are unpredictable. If the energy shortage continues, warmer clothes will be needed for winter, indoor wear. Cooler, lightweight garments will be necessary if we have less air conditioning being used.

unit of instruction:
Clothing Selection
Fabrics

subject area:
Energy Awareness in
Clothing and Textiles

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

To determine wise clothing selections and recognize choices and practices of clothing care that are energy wasting and energy conserving.

To be aware of energy efficient decisions in a wardrobe planning unit.

SPECIFIC OBJECTIVE

After completion of this unit, the student will be able to:

Evaluate fibers in fabrics, considering the amount of energy necessary to produce the fabric and the amount of energy necessary to care for the fabric.

BACKGROUND INFORMATION

Check the garment tag for fiber content. Today a wide variety of fiber blends and fabric finishes are available which make clothing easier and less costly to care for. Many fabrics are permanent press and soil repellent. For more information see state guides, teacher resources and references and classroom textbooks.

SUGGESTED ACTIVITIES

Level I - Save hang tags and labels from a variety of garments, both male and female. In class groups, sort through these, selecting garment labels with fibers or finishes which conserve energy.

Using pictures from magazines, etc., give four examples of how you use fibers and fabrics in your daily life. List the care they require and how they are energy efficient and energy wasting.

Level II - List all the garments you wear in 24 hours; these would include shoes, hats, hosiery, swimsuits, etc. Under each garment list all the material used in making it and the content of the material, i.e., cotton, wool, nylon, polyester, vinyl, leather, metal, etc.

a. With each item, identify the sources of energy used in its development.

b. Discuss the kinds of care required for different fibers and fabrics. (Dry cleaning, different washer and dryer cycles, different washing and drying methods, ironing required.) Which uses less energy? Which uses the most energy? Consider extra expenses such as for the gasoline used driving to dry cleaners, etc.

unit of instruction:
Clothing Selection
Fabrics

subject area:
Energy Awareness in
Clothing and Textiles

suggested for:
Level I (Junior High)
Level II (Senior High)

continued

EVALUATION TECHNIQUES

After completion of activities, students will be able to make energy efficient decisions on fiber and fabric selection.

SUGGESTED MATERIALS AND RESOURCES

Filmstrip "Cotton Scores New Goals," The Sanforized Company, Educational Services, Care of Karol Media, East 36A Midland Avenue, Paramus, New Jersey 07652. Sound filmstrip features little known facts about America's own natural fiber, the role cotton plays in students' everyday living, upcoming fashion trends for girls and boys, new ways 100% cottons are being improved.

DEVELOPED BY

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unit of instruction:
Clothing Construction

subject area:
Energy Awareness in Clothing and Textiles

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

To utilize practices for clothing construction which will help conserve energy.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

Apply principles of energy conservation as they relate to the equipment used in clothing construction

Select and construct an appropriate energy-related project.

BACKGROUND INFORMATION

The uses of energy for clothing construction include electricity for sewing machine, steam or dry iron, electric scissors and lighting.

To operate efficiently, electric equipment must be properly maintained. Consult care and use manuals to determine their maintenance requirements. Utilize natural light.

Because the iron is the major energy user in the sewing room, it is important to keep the iron turned off after pressing sessions and to do as much pressing as possible at one time.

SUGGESTED ACTIVITIES - See Attached Assignment Sheets

EVALUATION TECHNIQUES

After completion of assignments, student will be able to evaluate energy use in the sewing room.

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assignment

Activity I

Level I & II

Select one of the suggested projects: draft stoppers (directions on page CT 5-3), comforter, "snuggler" (a lightweight bag that can be slipped over the legs to keep warm), quilt, drapery liners, insulated shades. Construct and describe how it results in energy savings and how it will be used.

Activity II

Level II

Design a sewing room, taking into consideration all energy using factors. Be sure to include in your design the following sewing equipment:

Sewing Machine
Iron/Ironing Board
Scissors
Lighting
Windows
Laundry Equipment

Activity III

Level II

Class FHA Project - Obtain permission from a local fabric store to set up a display or for students to do a demonstration on:

a. Reducing energy use in the sewing room.

b. Selecting fabrics that are low energy users in their care, such as drip-dry vs. dryer; hand wash vs. machine wash; dry-cleaning vs. home care; fabrics without special finishes vs. fabrics that are wrinkle and soil resistant.

Activity IV

Level I & II

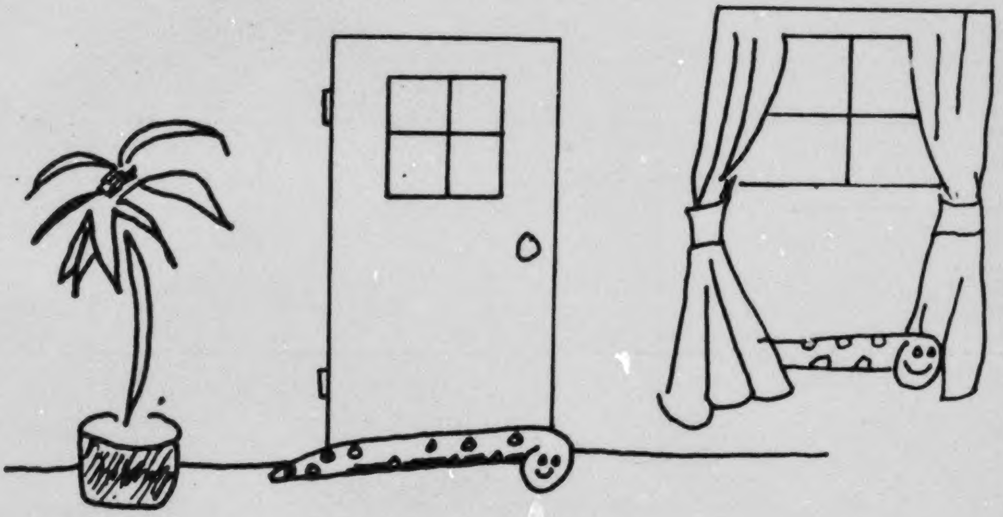
Have a student demonstrate the use of a steamstress and compare it to the steam iron. Compare the wattage of a steam iron to a steamstress (Nasco '79 catalogue; pp. 289-290). Determine which would be a better choice for an "energy aware" consumer based on efficiency and effectiveness. Is a dry iron and press cloth a wiser choice?

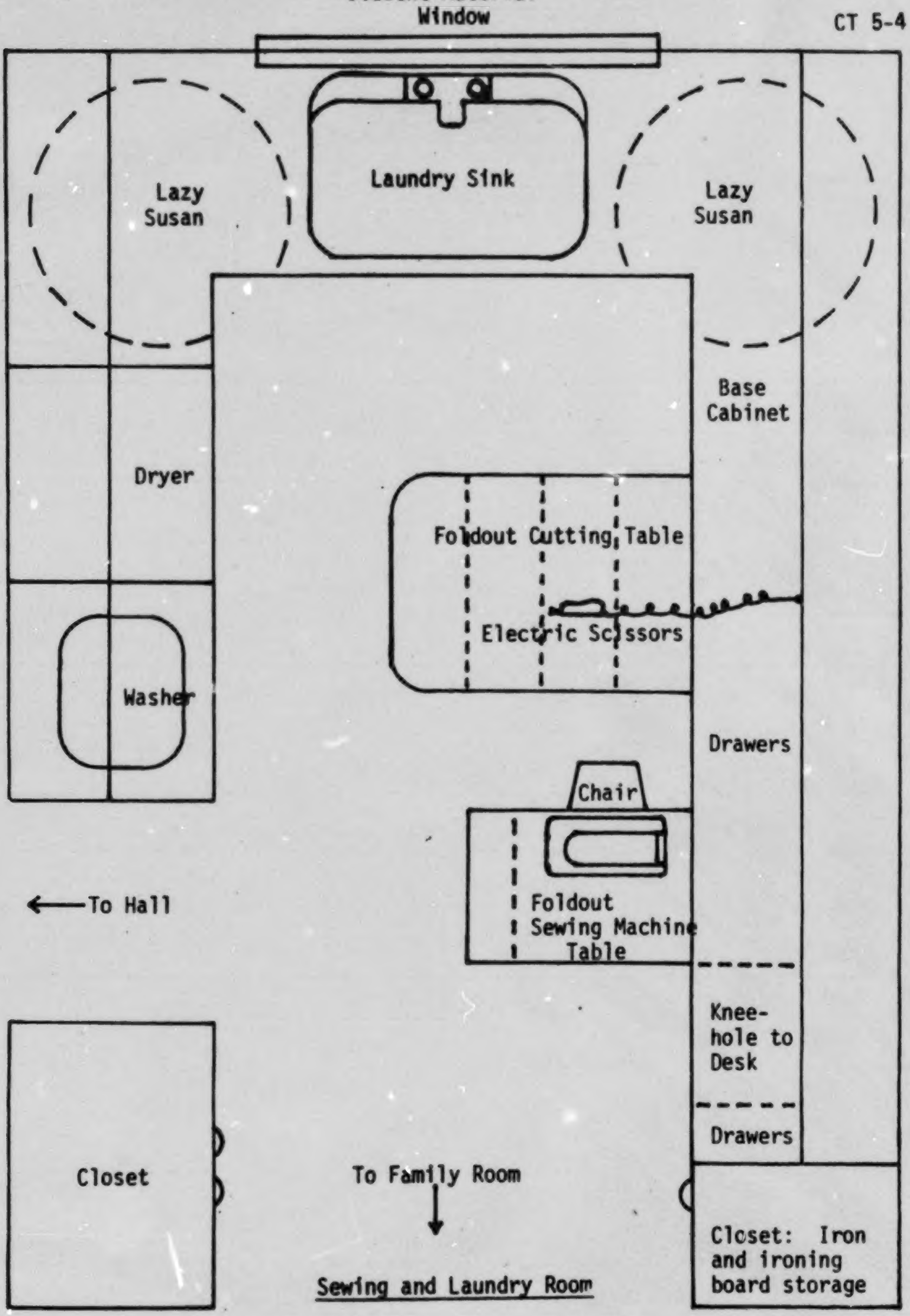
assignment

Draft Stopper

1. Cut a piece of material 5" wide and the length of the windowsill or the width of the door opening.
2. Fold the piece lengthwise, right sides together.
3. Using a 3/8" seam allowance, stitch down the long side and across one end.
4. Clip corners off.
5. Stuff with polyester fiberfill, shredded foam, or hosiery, or fill with sand.
6. Fold in seam allowance of open end and stitch closed.

Variations: Flower, animal, snake, personalize with name, etc.




Window
Lazy Susan
Laundry Sink
Lazy Susan
Base Cabinet
Dryer
Foldout Cutting Table
Electric Scissors
Washer
Drawers
Chair
Foldout Sewing Machine Table
To Hall
Knee-hole to Desk
Drawers
Closet
To Family Room
Closet: Iron and ironing board storage

Sewing and Laundry Room

Where are the energy users?
What lighting applications would be the most energy-efficient? Why?
What use can be made of the window?
How much energy do electric scissors use? Why use them?
What laundry techniques can be used to use energy efficiently?

unit of instruction:

Recycling

subject area:

Energy Awareness in Clothing and Textiles

suggested for:

Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

To develop an awareness for the importance of energy conservation in clothing care and construction.

SPECIFIC OBJECTIVES

After completion of this unit,the student will be able to:

relate significance of recycling clothing and conserving energy.

demonstrate skill in recycling by constructing a recycled garment or an accessory.
practice making repairs that will add years of use to your clothing.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES - See Assignments Attached

EVALUATION TECHNIQUES

After completion of assignments, student will be able to practice recycling techniques.

SUGGESTED MATERIALS AND RESOURCES

"Clothing Care and Repair Unit" - $13.95 Nasco only WA1641H - multi-media learning unit that includes all aspects of clothing care from cleaning methods to simple mending and altering. The unit includes 20 transparencies, 12 spirit masters, a 10-day lesson plan and cassette tape.

The Mender's Manual by Estelle Foote, M. D., published by Harcourt Brace Jovanovich, Inc. 1976.

"How To Sew To Save Money", Family Circle 9/20/77. Excellent pull out section with directions and illustrations from E. Foote's book on basic clothing repairs.

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background information

Saving Energy and Developing Creativity in Recycling Clothing

One of the challenges to professional Home Economists in recent decades has been to help our students or clientele, whether youth or adults, to be aware of and understand new technological developments in our area. The "what's new" topics seem to have a certain appeal to the teacher and the learner. In fact, U. S. consumers in general have become very accustomed to expecting a constant availability of new products in the marketplace. The technological boom and economic situation created what some refer to as a "throw-away society" in our country. Product purchases, such as clothing and appliances, are made simply because it is new on the market or in an effort to keep up with what a friend or relative has bought. Little thought may be given to the benefit in relation to cost to the individual or family. Is it needed to replace an item that is no longer usable? How frequently will it be used and does frequency of use justify cost? What can be done with the item that the new purchase will replace? Answers to these questions can have a great impact on individual, national, and world resources. As we read about such concerns as inflation, availability and use of raw materials, and protection of the environment in our country, what can we as Home Economists do to help our students or clientele to make better use of resources? An area that is a natural for our classes or programs is extending use or wear-life of textile products.

Technology has provided us with fabrics that have great durability. We often grow tired of or outgrow clothing long before it is actually worn out. Quite often an item of clothing may not be worn simply because it is outdated in fashion. Many of these garments are disposed of with little thought or concern about whether or how the use-life of the garment might be extended.

background information

Continued

Recycling of clothing not only saves money, but it also is a way for consumers to conserve energy and raw materials used in production of apparel. Concern about these factors has caused the textile industry to embark on a recycle and save theme.* Methods have been developed to recycle synthetic fiber waste materials, waste water, heat, and chemicals. All of these processes are aimed toward conserving energy, water, and raw materials and controlling environmental pollutants.

Current interest in antiques, heritage, and fashion adaptations from the past has removed some of the stigma many people have had about old things. However, there are a number of adults and youth who lack the incentive and/or desire to make use of the "recyclables" available to them.

A clothing unit or program on recycling apparel is a good way to teach and develop the creative potential in every student. Unfortunately, due to lack of encouragement and development, some individuals' creative abilities never emerge. The challenge to the teacher is to provide opportunities that inspire and allow the student - whether teen or adult, male or female - to engage in the process of creativity. Learning to see and gain confidence in use of color, texture, shape, and form are part of this creative process. Fabrics and garments no longer worn provide a perfect outlet for experimentation with these elements of design. In some situations, the process and self-confidence achieved by the student may be of greater importance than the final product of the recycling project.

To inspire the students, a teacher or leader might select several clothing items from his/her and/or family member's or friend's wardrobe that are not currently being worn and use these garments to discuss such areas as:

1. Where to find garments to recycle (closets, garage, or rummage sales, secondhand and thrift shops)

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*Daily News Record, July 5, 1978, p. 14

background information

Continued

2. Reasons for recycling
3. How to decide whether garment or fabric can be or is worth being recycled
4. What is involved in recycling: creativity
   sewing skill
   time
   cost
5. How can the article that cannot be made into a wearable be used?

Suggest that individuals look through their closet or other family member's closet for clothing items that they have not worn during the past year. A recycling inventory sheet may be a helpful aid. The inventory sheet format might include the following:

Type of Garment	Why Garment Hasn't Been Worn	Changes That Could Be Made

The first two columns could be filled in at home and the third column during a class session. The class could be reminded of other sources for acquiring garments for recycling if they do not find suitable articles in their or family wardrobes.

Each person could bring to class 1 or 2 items they list on the recycling inventory or have acquired from other sources. Resource materials (such as magazines, pattern catalogs) and garments that have been recycled could be used for inspiration with the projects. Tracings of silhouettes similar to the garment to be recycled can be made from pictures in magazines, catalogs and newspapers. To experiment with ideas,

background information

Continued

students can sketch possible changes on the traced silhouettes. The creativity of individuals is often inspired by others. Groups of 3 or 4 persons working together on recycling ideas may provide a broader range of possibilities for use of each garment.

"Recycling cost sheets" for the recycled garments can be used to introduce the topic to group. A sample cost sheet is included on page TC 4-6. The cost sheet could be used in planning stages for students to estimate what cash outlay will be involved in the proposed garment changes. An estimate of costs can help the student decide which alternative for recycling a garment is the best decision. One aspect of this decision is economics. Actual costs of notions and materials can be recorded on the cost sheet when the project is completed. The sample sheet also includes time cost for recycling the garment. Local hourly wage level for the age group when employed in comparable skill jobs can be used as a guide for determining time cost of student project.

Alteration of garments is one of the most frequently needed and used methods of making non-wearables into wearables. A class or FHA chapter or other group with advanced sewing skills and knowledge of fitting could open an "alteration shop" as a special project. Sources for garments to alter might include faculty, other students, or student's family members. This project would provide a wide range of alteration experiences that could be applied immediately, as well as in the future, to personal and family clothing needs. In addition, alteration skills are very salable. Persons with this skill can find employment in a variety of types of clothing stores or in dry cleaning establishments. Or, they could start an alteration business in their home.

An exhibit or style show can provide an opportunity for students to share with others what they have learned. Color slides or prints of the garments before they are recycled can help tell the story. Color prints of the "before" with the "after" recycling changes would provide

background information

Continued

a series of eye-catching exhibits. Slides of the original garments could be flashed on a screen as the recycled garments are modeled. Information from the inventory and cost sheets would provide commentary for the style show. In addition, the slides would be a very good "ideas for recycling" resource to use with future classes or groups. If a reasonable estimate of the energy saved by all the projects in the show could be given (in terms of gallons of gasoline for example), that aspect of recycling could be given greater emphasis.

The sources of materials for recycling are limited only by what each person sees when s/he looks at a garment or a fabric. Personal resources of time, skill and money are usually needed but often can be acquired or adapted more readily than resources necessary to purchase new garments. Through recycling of textile products, consumers can make a genuine contribution toward the efforts to conserve on use of raw materials and control environmental pollution. And, finally, a recycling unit offers many opportunities for teaching principles, values and skills important in making decisions about individual and family clothing needs.

Recycling Costs

		Estimate	Actual
Present value of "old garment", if any		$ ________	$ ________
Supplies Needed:	Fabric Cost	$ ________	$ ________
Notions:	Zipper	$ ________	$ ________
	Buttons	$ ________	$ ________
	Snaps	$ ________	$ ________
	Thread	$ ________	$ ________
	Seam Tape	$ ________	$ ________
	Trim	$ ________	$ ________
	Elastic	$ ________	$ ________
	Other: ____________	$ ________	$ ________
	____________	$ ________	$ ________
Pattern:		$ ________	$ ________
Total Cost of Supplies		$ ________	$ ________

Time Spent: ____________ hours x $ __________ per hr. = $ ________

Total Cost of Recycling Project $ ________

Type of Garment Worked On ____

What I Did to Change Garment ______________________________________

Finished Product ____

Probable Cost of New Garment Similar to Finished Product $ ________

Less Cost of Recycling Project $ ________

Amount Saved by Recycling $ ________

background information

Guidelines For Recycling

Before a decision is made to begin a recycling project, the following questions may be useful:

- Is the garment in or near the size needed so that alterations can be made to acquire good fit?
- Is it torn or so badly worn that it will need a lot of repair - especially at knees, elbows, crotch, seat, underarm, seams?
- Is it badly faded or stained, especially where it shows the most?
- Will investment in new materials, such as fabrics and notions, required to make garment wearable be greater than the cost of a new garment of comparable type and quality?
- Can old hemline marks be removed or disguised in some manner?
- Is fabric a type which will not show needle marks when stitching lines are changed?
- Have darts been marked with holes or slashed?
- Is time available or can time be organized to allow for completion of the recycling project?
- Does the individual have or can individual easily acquire skills needed for the type of recycling needed?
- Will the recycled garment be worn and enjoyed?

In general, there are four major types of recycling projects:

Simple Changes - Little sewing skill or experience is required. Major needs are ideas, some time, and some cash outlay.

- Purchase or construction of a new blouse to make a sweater or jacket and skirt stylishly companionable.
- Addition of current accessories to update garments.
- Simple mending that would make an article wearable.
- New buttons, addition of trim or a change of sleeve length from long to short can increase wear-life of a garment.

background information

Continued

Alteration Changes - Sewing skill and an understanding of fit are helpful for these changes. If the individual has these abilities, the major investment will be in ideas and time. Cash outlay is usually minimal.

- Length of garment adjusted to make it more wearable and fashionable.
- Width of garment areas changed by increasing or decreasing seam widths and darts, adding panels of fabric, etc.
- Change of neckline and armhole areas to make garment fit or to attain more attractive style lines.

Restyle Changes - Ideas and sewing skill are major requirements for these changes. Some purchases of notions and fabrics may be desired. This type of recycling involves changing part of a garment.

- Make a dress into a jumper.
- Shorten a coat into a jacket.
- Add or eliminate design details or change style for new appearance.

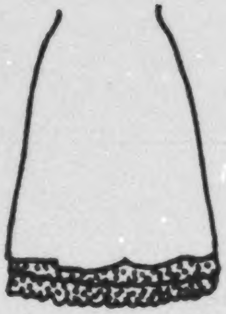
Major Renovation - Experience and advanced sewing skill are needed for success with this type of recycling. Usually, the greatest resources required are time, ideas and patience.

- Make-over of a garment that is outgrown, out of style, or of a wrong color for another individual.
- Construction of a garment from fabric of two or more garments to make a new garment or outfit.

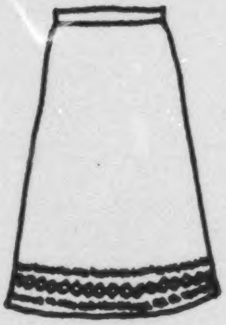
Some articles may not be usable for renovation to a wearable garment. Before these items are destroyed, consider whether:

- Buttons, zippers, or trims could be removed for further use.
- Fabric could be used for making patchwork, soft fabric sculptures or jewelry, wall hangings, braided rugs or other creative uses.
- School or local theatre groups might have use for articles as costumes, or children would enjoy them for "dress-up".

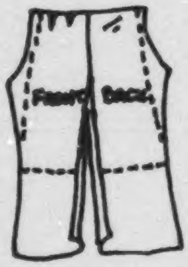
background information

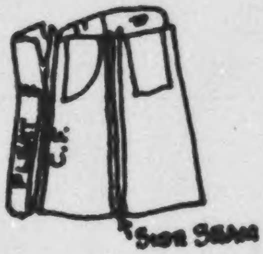


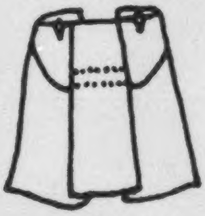
Lengthen skirt with ruffled embroidery trim or tiers of gathered fabric.



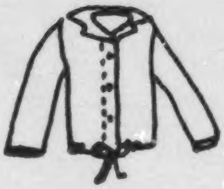
If old hemline shows when you let a hem down, cover line with trim or decorative stitches.



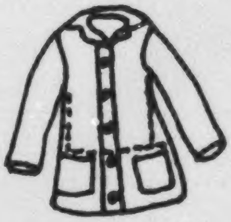


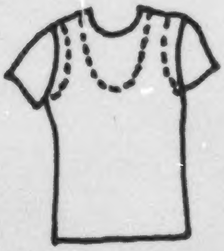


Make a skirt from man's trousers.

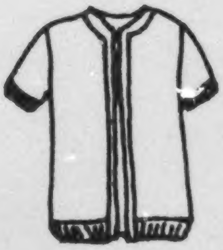


Make a waist length jacket from a long jacket.





Create a tank top from a tee-shirt.



Make a pullover sweater into a cardigan.

Resource: "Developing Creativity In Recycling Clothing"
Illinois Teacher of Home Economics, "Developing Creativity in Recycling Clothing", Volume #22. Issue 3, pages 189-192, 1979,
Marjorie Sohn.

assignment

Activity I

Level I

Complete a wardrobe inventory and determine those items which are not currently usable but could be recycled. (See Illinois Teacher chart, p. CT 6-4) Time: 2 class periods

Activity II

Level I & II

A. Use one of the decorating methods suggested in background information (patches, embroidery, appliques, trims, fusible web) to recycle a garment or accessory such as a belt, purse, pillow, wall hanging.

B. Develop an evaluation device to be used on completed project.

C. Student completes step I and II on Recycling Worksheet in planning, step III, IV, and V in getting project started, and VI to evaluate. Time: 1-3 weeks

Activity III

Level I & II

To build enthusiasm for recycling dated clothing or accessories, show examples, filmstrip or pictures. Time: 1-2 class periods

Resource 1 - Frank Clay films, "Revitalize Your Clothes", 11 minutes, $23.00. Filmstrip and cassette discussion guide. Shows inexpensive, creative ways to recycle; shows "before and after" samples; ecology in choice of fibers.

Resource 2 - Illinois Teacher, January/February 1979 pp. CT 6-2 - 6-9.

Resource 3 - Consult current magazines for pictures and directions.

Activity IV

Level I & II

1. Discuss where to find garments to recycle (closets, garage, rummage sales, second hand and thrift shops).
2. Discuss reasons for recycling (see background information).

assignment

Continued

3. Discuss how to decide whether garment or fabric can be or is worth being recycled. See "Guidelines for Recycling", Illinois Teacher p. CT 6-7 - 6-9.

4. Discuss: What is involved in recycling - creativity
   sewing skill
   time
   cost (see "Recycling Costs", Illinois Teacher, p. CT 6-6)

5. Discuss how the article that cannot be made into a wearable can be used.

   Refer to Illinois Teacher for guidelines. Time: 1 period

Activity V

Level II

Adapted from Sewing - May 1979 Seventeen; "Seventeen at School", Teacher Ideas p. 19. Time: 1 period and on own time

A. Special project for one or a small group: Students research natural fabric dyes (art teacher may be a good resource person). Experiment with plants, fruits, berries, tree bark, run-off water from old mines and mineral-laden rock.

   Do fabrics hold the color?

   How intense can they be dyed?

   Can you develop unusual hues?

   What care does the dyed fabric require?

B. Suggest that students dye fabric lengths in coordinating colors to organize a wardrobe for the current season. Time: 1 period

C. List garments from student's recycling list that could be dyed to make them fit current colors and go with wearable garments. Time: 1/2 class period

Activity VI

Level I

Time: 3-4 periods Teacher demonstrates and class members practice:

assignment

Continued

a. Urgent repairs

    1. Sewing on a button
    2. Repairing seams
    3. Repairing crotch area
    4. Shortening or lengthening hems

b. Wear and tear

Level II

Time: 6-8 periods

a. Urgent repairs

    1. Replacing waistline elastic

b. Wear and tear

    1. Turning a collar
    2. Replacing knit cuffs
    3. Repairing pockets

c. How to darn

    1. Hand
    2. Machine

d. How to patch

e. Tailor's alterations

    1. Waistlines - taking in or letting out
    2. Replacing broken zippers: fly front
       skirt - 1 lap
       dress - centered

Evaluation - 1. Written page on workmanship prepared by teacher

2. Students orally describe a procedure to class and relate how this recycling is conservation of energy.

assignment

Recycling Worksheet

1. Collect some ideas for recycling clothes or other items into clothes, i.e., fliptop vest, jeans into skirt, purse, hat. Take apart full skirt, reuse zipper, yardage - make into a new garment.

   Be prepared to show and discuss with the class and/or teacher.

2. Describe your ideas for a recycling project . . . what materials and equipment are needed? What sewing skills (or other skills) are needed?

3. Make a sketch and determine steps to follow in sequence.

4. Set time goals and make a construction plan.

5. Estimate cost:

6. Evaluate project:

unit of instruction:

Personal Care

subject area:

Energy Awareness in
Clothing and Textiles

suggested for:

Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

To develop an awareness for the importance of energy conservation in grooming.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Demonstrate ways in which energy is consumed and may be conserved in bathing and grooming by all family members.
2. List grooming and bathing appliances; estimate wattage and cost of use.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES - See Assignments attached

EVALUATION TECHNIQUES

After completion of assignments, students will be able to evaluate personal grooming habits for cost and energy savings.

SUGGESTED MATERIALS AND RESOURCES

See End of Unit Resources, pp. CT 8-1 - 8-3.

DEVELOPED BY

Annie Adkisson
Mary Jo Bruskiewicz

background information

Grooming involves the consumption of hot water, electricity and petroleum products. The simplest, most direct way to reduce the energy used for grooming is to limit the use of equipment which requires electricity. Another way is to restrict the use of hot water.

The following are tips to aid in saving energy while grooming:

1. When no longer in use, equipment should be turned off, disconnected, and stored (out of reach of young children).
2. Electric equipment should be properly maintained. Check for faulty wiring, dials, thermostats, and seals. Keep equipment clean.
3. Use equipment only when necessary. For example, air dry hair when possible, brush your teeth "by hand" and polish your shoes "by hand."
4. Keep light fixtures clean.
5. Keep exhaust fans and ventilators clean.
6. Avoid overheating the bathroom. An exhaust fan may be used to remove excess heat and moisture from a bathroom more efficiently than by air-conditioning.
7. An electric shaver may be more energy conserving than shaving with a blade if a great deal of hot water is used, not to mention shaving cream.
8. Encourage members of your family to bathe one after the other to take advantage of the warmth of the fixture (and room) from previous use.
9. Avoid drafts near the tub or shower which would encourage the use of a higher water temperature.
10. Check for leaking faucets.
11. Take short showers instead of baths.
12. Reduce the duration of showers.
13. Fill the lavatory with warm water, rather than allowing it to run when washing or shaving.
14. During winter, allow the water for baths to cool (releasing heat to the bathroom) before draining.

assignment

Activity I

Level I & II

Have a small student group set up a display case of grooming supplies such as electric shaver vs. blade and hot water; hair dryer vs. air dry; brush teeth by hand vs. electric tooth brush; electric make-up mirror vs. good or poor general lighting; sun lamp vs. outdoor; face massager or cleaner vs. wash cloth; rollers vs. curling iron; shoe polisher vs. soft cloth - to arouse interest in energy conservation by their friends; to show wattage and KWH of certain grooming appliances. Time: 2 periods Refer to PFR 9-3 or HF 4-5 or Energy Budget Manager from Public Service Company of Colorado

Activity II

Level I

Students develop a check list to take home to evaluate the use of grooming appliances and good/poor bathing habits that relate to energy within their own family. Have the student improve one bad habit and describe in writing or orally how this was done. Time: 1 period and take home

Activity III

Level I & II

Using grooming tips from background information, student chooses an activity:

a. Make a bulletin board
b. Make a word scramble or crossword puzzle
c. Write a short script for puppet show
d. For FHA project in elementary school, make puppets for activity c.

Activity IV

Level I

Divide class into three groups. List all activities which are conducted in a 24 hour time period which deal with personal care. One group should pantomine the activities using convenience products, i.e. electric razor, electric toothbrush, etc.; the second group should pantomine substituting personal energy, i.e. towel-drying hair, quick shower instead of long bath, etc., while the third group keeps a summary sheet on how energy can be saved. Time: 1 period planning, 1 period doing

Clothing and Textiles Resources

1. "Tips for Energy Savers" - May 3, 1979
A 32-page booklet produced by the U. S. Department of Energy (DOE), contains hundreds of practical suggestions on how to conserve and use energy more effectively. Free single copies are available from: DOE/Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37830. Negatives are lent without charge to organizations that plan to reprint quantities of TIPS. For a set, contact: Division of Editorial Services, Office of Public Affairs, Department of Energy, Washington, D. C. 20585.

2. From J. C. Penney
"Energy: Crisis and Opportunity" - This magazine presents information on the complex interdependencies of energy, growth, the environment and the quality of human life. Order copies @$1.25 each from: Energy: Crisis and Opportunity, Consumer Education Department, J. C. Penney Company, Inc., 1301 Avenue of the Americas, New York, New York 10019.

3. From U. S. Department of Energy
"Tips for Energy Savers" - a 46-page booklet of practical suggestions for saving energy in and around the house, on the road, and in the marketplace. Order from: U. S. Department of Energy, Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37830.

4. From Center for Renewable Resources
"Solar Energy Education Packet for Elementary and Secondary Students" - this interdisciplinary selection of activities, reading lessons, and background materials covers such renewable resources as sun, wind, water and biomass. It also includes an annotated bibliography of solar publications. Order copies @$3.75 each plus 15% to cover postage and handling. "Solar Energy Bibliography for Elementary, Secondary and College Students" - this booklet serves as a valuable guide to hundreds of solar publications and audio/visual materials. Order copies @$2.50 each plus 15% to cover postage and handling. Order both booklets from: Solar Sundries, Center for Renewable Resources, 1028 Connecticut Avenue, N. W., Washington, D. C. 20036.

5. A Microcomputer "Compucolor II"
A portable and self-contained unit, size of portable TV - $1495 - available in local computer store or contact: Compucolor Corporation, P. O. Box 569, Norcross, Georgia 30071, phone: (404) 449-5996. Ad in April/May 1979 Today's Education NEA.

6. "Clothing Care and Repair Unit" - $13.95
Nasco Only WA1641H - Multi-media learning unit that includes all aspects of clothing care from cleaning methods to simple mending and altering. The unit includes 20 transparencies, 12 spirit masters, a 10-day lesson plan and cassette tape.

Clothing and Textiles Resources - Continued

7. "Household Energy Conservation" - $5.00
Nasco Only WA2249H - 9 puzzles dealing with practical aspects of conserving energy at home, including heating and cooling homes, water usage, cooking, laundry and home planning, petroleum products and their importance.

8. "Create-A-Game - $10.95
Nasco Only WA1901H - Blank baseball board game - create your own questions and answers related to energy saving. Two persons or two teams use heavy plastic game mat, dice, tokens, blank question cards.

9. "Garage Sale" - $5.25 - WA872H
Encourages students to be resourceful; helps students establish guidelines on buying and utilizing second-hand items. Could be adapted for use with recycling, used appliances, such as sewing machine, iron, washer, hair dryer, etc.

10. Textbook "Creative Living" - copyright 1979
Student text - $9.95; Teacher guide - $5.95; Spirit Master - $9.95. Butterick Publishing, P. O. Box 1945, Altoona, Pennsylvania 16603.

11. "Energy Conservation in the Home"
Energy Education/Conservation Guide for Home Economics Teachers. Prepared by The University of Tennessee, Knoxville, Tennessee, 1977. Refer to Clothing Unit and Personal Care Unit.

12. Booklet "Save Energy" (No. C967-1534)
1-24 copies 75¢ each; 25-99 copies 50¢ each; 100-499 copies 25¢ each. Scriptographic style - combination of key words - every page has suggestions on how to conserve energy - easy to read and understand. Order from: Channing L. Bete Co., Inc., 45 Federal Street, Greenfield, Massachusetts 01301.

13. "Textiles and Energy" - Journal of Home Economics - May 1978

14. "Textiles and Energy Conservation" - Illinois Teacher of Home Economics, January/February 1979.

15. "Save Energy with Textiles" (booklet) American Textile Manufacturers Institute, Charlotte, North Carolina.

16. "Energy Saving Tips" Forecast February 1979 - p. 72 Coed p. 28

17. "People and Earth's Resources"
12 color transparencies, 12 masters, guide. Contemporary Values Series, Milliken. Available from Home Economics School Service, 10,000 Culver Blvd., Dept. 8, P. O. Box 802, Culver City, California 90230.

18. Publications available from:

The Consumer Information Catalog Spring 1979 - General Services Administration

Sixty-Five Ways to Save Natural Gas
607G - Free - 46 page 1978. How to save energy on home heating, cooling, appliance use and in family activities.

Solar Hot Water and Your Home
608G - Free - 20 page 1978 illustrated guide explains how solar hot water systems work, types available, shopping tips, lists manufacturers and sources of further information.

Water Conservation Checklist for the Home
081G - 70¢ - 8 page 1978. How to conserve and recycle water for other uses.

Return orders to:
Consumer Information Center
Pueblo, Colorado 81009

If ordering free publications only, please note FREE on the envelope. If ordering any pay publications, please send to the attention of R. Woods.

19. Pamphlets:

Energy Budget Manager
Public Service Company of Colorado
550 15th Street, Room 974
Denver, Colorado 80202
(303) 571-7713

INDEX

Section: Housing and Home Furnishings

Unit I. - Automatic Washers, Dryers; Laundering and Ironing

Unit II. - Water Heaters and Water Usage

Unit III. - Lighting

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Unit V. - Floor Coverings

Unit VI. - Window Treatments

Unit VII. - Interior Decorating

Unit VIII.- Home Heating

Unit IX. - Insulation

Unit X. - Caulking and Weatherstripping

Unit XI. - Windows and Energy

Unit XII. - Housing and Home Furnishings Resources

unit of instruction:	**subject area:**	**suggested for:**
Automatic Washers, Dryers; Laundering and Ironing	Housing and Home Furnishings	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

Upon completion of this unit, the student should be able to summarize factors important in the purchasing and use of an automatic washer and dryer; and organize laundering and ironing activities to conserve energy. This knowledge will be evidenced by completion of assigned activities and scoring 75% or better on the written quiz.

SPECIFIC OBJECTIVES

The student will:

1. Identify procedures in both washing and drying clothes that save energy.
2. Recognize special energy saving features on automatic washing machines and clothes dryer.
3. Analyze current procedures used in laundering and ironing of clothes.
4. Modify current laundering and ironing procedures as to conserve energy.
5. Be aware of the energy consumed in laundering.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES - See Assignments Attached

EVALUATION TECHNIQUES

After completion of assignments, student will be able to conserve energy in laundering and ironing clothes.

SUGGESTED MATERIALS AND RESOURCES

"The Woolite Fashion Flash" - Free, one copy of an illustrated poster packed with special care instructions for laundering many types of clothing. Bayle-Midway, Attn: Sales Promotion Dept., 685 Third Ave., New York, New York 10017.

"Energy Conservation in the Home", an energy education/conservation curriculum guide for home economics teachers, U.S. Department of Energy, prepared by The University of Tennessee Environment Center and College of Home Economics, Knoxville, Tennessee, 1977, p. 151-152.

Contact your local public utility company and/or state university.

DEVELOPED BY

Sharon Stucka

background information

I. Washers, Dryers and Laundering

  A. Use of Automatic Washers

    1. Wash full loads or make use of water level setting for smaller loads.
    2. Don't overwash clothes. Delicate clothes don't need as long a wash cycle as dirty work clothes. The major cost of washing clothes is the hot water used.
    3. Use hot water only when absolutely necessary. Many fabrics can be washed in warm or cold water. There are a number of cold water detergents on the market.
      a. A suds saver will allow you to reuse hot or warm wash water for several loads.
      b. If you have a laundry tub next to your washer, save the hot sudsy water from the wash to clean barbecue grills, garden tools, oven racks, etc.
    4. Use the soak cycle, which may eliminate the need to wash heavily soiled clothes more than once.
    5. If machine does not have a self-cleaning lint filter, clean regularly to make washer run efficiently.
    6. Use cold water rinse whenever possible to save the energy needed to heat the water.

  B. Purchase of Automatic Washers

    1. Ask yourself the following questions:
      a. Do I really need a new washer?
      b. Will it save me steps in time and labor?
      c. Would the time, energy and money saved enable me to spend more constructive time with my family?
    2. Look for the special energy saving features.
      a. Water level control - available on most washers.
        1. Enables machine to be set for a partial fill to wash a small load.
        2. Look for one with a choice of two or more water levels - or infinite (solid state) control.
      b. Water temperature control
        1. Offers you a choice of hot, warm or cold wash temperatures; warm or cold rinse temperatures.

background information

Continued

C. Use of Automatic Dryer

1. Operate dryer with a full load (but don't overload) with fabrics of similar weight
    a. Fabrics of similar weight should be dried together in order to prevent under and over-drying.
2. Use correct temperature setting to prevent under or over-drying.
    a. Over-drying any fabric increases wear and tear and causes yellowing in addition to using more energy.
3. Select correct temperatures for fabrics being dried. Use the automatic selections, if they are available, to avoid over-drying.
4. When dryer stops, remove clothes quickly in order to avoid wrinkles and extra ironing.
5. Use leftover heat to dry light synthetic garments and only partially dry items which are to be pressed immediately.
6. Keep the lint filter clean. A dirty lint filter can lengthen the drying time.
7. Vent dryer to increase its efficiency. Occasionally, check the vent to make sure it is not clogged. A clogged vent can cause your dryer to consume more energy.
    a. All gas dryers must be vented outside.
    b. If you vent your electric dryer into the home, do it away from the dryer location. Humidity buildup makes your dryer work harder.
8. Try to place the dryer in a warm area. It will have to operate longer in an unheated garage or utility room because cool air taken in must be warmed.
9. The bottom line for dryer energy savings is: Use the clothesline whenever possible. - Solar Dryer.

background information

Continued

D. Purchase of Automatic Dryers

1. Special energy saving features available

   a. Timed controls

      1. The user manually sets the numbers of minutes of drying time, basing it on the type of fabrics and the size of the load. The dryer shuts off when the time is up, but can be reset if clothes aren't dry.

   b. Automatic moisture sensing (electronic) control

      1. By far the most accurate type of control, it uses both a thermostat and a moisture sensor. It shuts off automatically when the sensor "feels" the proper amount of moisture has been removed from the clothes.

   c. Automatic temperature sensing control

      1. The user selects a control on the dryer that most accurately describes the fabrics in the washload. The dial is a combined thermostat and timer which automatically determines the temperature and drying time.

   d. Permanent press and/or cool down cycles

      1. If clothes are removed immediately, cycle eliminates or or reduces amount of ironing.

E. Laundering and Ironing

1. Read the operation manuals for your washer, dryer, and iron and take advantage of energy saving instructions. Read maintenance instructions and follow them carefully.

2. Hand irons consume as much energy as ten 100-watt light bulbs. Time can be reduced by ironing large batches of clothes at one time, avoiding heating up the iron several times, ironing fabrics which require low temperatures during warm-up and cool-down periods, and turning off the iron when interrupted for any length of time and when finished.

3. Use the lowest iron temperature required for each fabric. For example, synthetics require the lowest temperature; silk and wool require medium temperature; and cotton and linen require high temperature. Matching the temperature setting to the fabric prevents scorching or under-pressing.

assignment

Level I

1. Demonstrate the operation of the washer and dryer in your classroom. Then, if possible, have the students go home, observe the procedure there, and do a load of laundry on their own.

2. After presenting the background information, have the class discuss which features and procedures they thought were most valuable. Help them devise a questionnaire to take home. Once this is done, discuss the results and have them make suggestions for improvement.

Level II

1. With parent cooperation, have the students take on the laundry and ironing responsibilities in their own home for one week. After the week is over, ask them to pool ideas that they used to save electricity and/or gas as well as short cuts to conserve their own time. Have the students complete the assignment sheet.

2. Do a comparison of many styles, models, and brands of both washers and dryers. This would involve visiting stores, etc. Then come back to compare and discuss the advantages, disadvantages, cost, etc.

A cnart like this would be helpful:

WASHERS

Model	Water Level Control	Temperature Control	Other	Cost

DRYERS

Model	Timed Controls	Automatic Moisture Sensing Control	Permanent Press or Cool Down Cycles	Other	Cost

assignment

1. When washing clothes use ____________ water to wash only when absolutely necessary and ____________ water to rinse whenever possible.
   - a. cold and cold
   - b. hot and warm
   - c. hot and cold
   - d. warm and cold

2. Energy saving features on a washing machine include:
   - a. water level control
   - b. suds saver
   - c. water temperature control
   - d. all of the above

3. Over-drying any fabric increases:
   - a. energy consumption
   - b. wear and tear to the garment
   - c. causes yellowing in the garment
   - d. all of the above

4. Ironing time and energy consumption can be reduced by:
   - a. just ironing the particular item of clothing when needed
   - b. ironing fabrics which require low temperatures during warm-up and cool-down periods
   - c. leaving the iron on during breaks to avoid having to re-heat it again
   - d. none of the above

assignment

Answer Key to Assignment Sheet

1. c hot and cold
2. d all of the above
3. d all of the above
4. b ironing fabrics which require low temperatures during warm-up and cool-down periods

unit of instruction:

Water Heaters and Water Usage

subject area:

Housing and Home Furnishings

suggested for:

Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

Upon completion of this unit, the student should be able to associate the role of a water heater to home water and energy conservation; and propose a plan of water and energy conservation for his/her own home. This knowledge will be evidenced by completion of assigned activities and by scoring a 75% or better on the written quiz.

SPECIFIC OBJECTIVE

The student will:

1. Apply information on water heaters, such as size, location and temperature, to their own home situations.
2. Compare the amount of water used and energy saved between showering and bathing.
3. Relate to other family members ways to save water and thus energy in the home.
4. Demonstrate a family's hot water consumption and possible conservation measures.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES - See Assignments Attached

EVALUATION TECHNIQUES

Upon completion of assignments, student will be able to conserve water as evidenced by their increased awareness of alternative methods in water usage.

SUGGESTED MATERIALS AND RESOURCES

Contact your local public utility company and local land grant (state university.

Energy and Man's Environment, 0224 S. W. Hamilton, Suite 301, Portland Oregon 97201.

Energy Conservation in the Home - an energy education/conservation curriculum guide for Home Economics teachers. U.S. Department of Energy, prepared by The University of Tennessee Environment Center & College of Home Economics, Knoxville, Tennessee, 1977.

DEVELOPED BY

Sharon Stucka

background information

I. Water Heaters and Water Usage

A. Water Heaters

1. When purchasing a water heater, match its size to the needs of your family. Oversized water heaters use more energy than necessary.

2. Heating of water continues even if hot water is not being used. Get a well-insulated hot water heater that uses as little heat as possible, minimizing the re-heating process. Set the thermostat no higher than necessary for household uses. This is also appropriate if an automatic dishwasher is used.

   a. Set lower when on vacation.

3. Place the water heater as close as possible to where hot water is used. Long runs of pipe cool hot water, thus increasing operating costs.

   a. If you do have long pipe runs, insulate the pipe to decrease heat loss. This also conserves water which may be wasted by letting it run until it gets hot.

4. If you have a separate water heater for a bathroom, set it only at 110°-120° to save energy. Thus the water will be warm enough for comfort; the additional heat for sanitation is not necessary here, as for a dishwasher, etc.

B. Other Water Saving Practices

1. Showers

   a. Especially those fitted with flow restrictors or low volume heads, usually use less than a bath. But limit your stay! If you prefer a bath, refrain from completely filling the tub. A 5 minute shower uses 25 gallons. A bath uses 30 gallons. (What if you take long showers?)

   b. Do your showering and hair washing in one step. It takes less water than doing the hair separately.

   c. Turn water off in shower while lathering, shaving legs, etc. and turn on to rinse.

2. When washing dishes by hand, use a dishpan or stopper in the sink so you won't need to run the hot water continuously.

background information

Continued

3. When brushing teeth or shaving, run the water only when needed rather than continuously. (This also works with showers. Get wet, turn water off, lather up and rinse!)
4. One leaky faucet can waste up to 2,200 gallons of water a year - enough to quench your thirst with 35,200 glasses of water (8-ounce size). It may only require changing the washer of the faucet. (You will not only be saving the energy needed to heat the water but the energy needed to pump the water to your house.)
5. Toilets
    a. A water filled, capped bottle (quart size) in a toilet's water tank, or an adjustment of the float level reduces the normal 4.1 gallons of water to flush a toilet.
    b. A toilet leak can waste lots of water. Put a few drops of food coloring in your tank. If colored water shows in the bowl without flushing, there's a leak and repairs are needed.
    c. Avoid using the toilet as a trash basket. Tissues should go in the waste basket and cigarette butts in the ashtray.

C. Energy Usage

1000 watts = 1 kilowatt

1 kilowatt X 1 hour of use = 1 kilowatt hour
KW X 1 hour = 1 KWH
1 KWH X average KWH cost = cost of operation

1 KWH will heat 4 gallons of water 100°F. temperature rise
.25 KWH will heat 1 gallon of water 100°F. temperature rise.

1000 cubic feet = 1 MCF of natural gas
1 MCF X average MCF cost = cost of operation

1.3 cubic foot of gas will heat 1 gallon of water 100°F. temperature rise
(calculated at 840 BTU/cubic foot)
If the BTU content is different in your area, divide 1111 by the BTU content to derive quantity of gas needed to heat 1 gallon of water.

* NOTE: In some areas, natural gas may be sold in therms rather than cubic feet. One therm equals 100,000 BTU's. (British Thermal Units) and 1 BTU will raise the temperature of one pound of water one degree Fahrenheit. One gallon of water weighs 8.33 pounds.

assignment

Level I

1. Shower vs. bath activity (HF 2-5)
2. Have the students do a collage of pictures of all the ways and areas that they could conserve water. Have them share this with one another and then use the collages in a bulletin board or as part of a wall display.
3. (This activity could be used both in Level I and II) Have the students watch the newspaper for articles relating to water usage. Clip them out and bring to class. Discuss the implications of these articles on our lives.

Level II

1. Hot Water Audit Activity (HF 2-6 & HF 2-7)
2. Have students draw a floor plan for optimum water and energy conservation by placing the hot water heater near sources of use. Be sure they all share their drawings with one another.

assignment

Shower vs. Bath

Objective: To demonstrate that a short shower is more energy conserving than a bath, and that lengthy showers waste hot water and energy.

If people took short showers instead of baths or lengthy showers, a lot of energy could be saved. It takes about an ounce of oil (or a cubic foot of gas, or ¼ kilowatt-hour of electricity) to heat a gallon of water.

Compare the water used for a bath and a shower. Fill your bathtub (at the temperature and depth you like best) and measure the depth with a yardstick (when you are out of the water). Record the depth: ______ inches. At your next bathing time, take a shower (in the same tub). Keep the drain closed during your shower, but be careful not to overflow the tub. (Do not rush your shower; take your time!) This time record your bathing time as well as the water depth.

Beginning Time ________________ Ending Time ________________

Duration of Shower ______________ Water Depth ________________

If you took a short shower, it should have required only about half as much water as your bath.

Questions:

1. What bathing practice is more conservative for you?
2. What would be the energy impact of taking a 20-minute shower?
3. What are some other ways to conserve energy while bathing?

Suggestions:

1. If your shower was lengthy you may need to measure the depth, empty the tub and then finish your shower and measure again. Add the two depths.
2. Investigate the bathing practices of other members of your family. Who is most conservative?

From an Energy Education/Conservation Curriculum Guide, field testing draft 1977, University of Tennessee.

assignment

Hot Water Audit

Objective: To demonstrate a family's hot water consumption and possible conservation measures.

The major uses of hot water in the home are for bathing and laundry. Use the data sheet provided to estimate your family's hot water consumption for a week.

Task	Number of times per week	Multiplier (in gallons)	Quantity of Hot Water (in gallons)
Laundry loads		15	
Tub baths		25	
Showers		20	
Dishwasher loads		10	
Washing dishes by hand		5	

Total ____________

Tally the number of times per week the task using hot water occurs. Then multiply the number of times by the multiplier provided. The multiplier is the average amount of hot water required for the task. The resulting value is the quantity of hot water consumed for the task. Then add the quantities for each task to arrive at an estimate of the hot water your family uses in one week. (The average household uses about 350 gallons of hot water per week.)

You can now approximate the energy required to supply this quantity of hot water.

ELECTRIC WATER HEATER

____________ gallons x .25 KWH/gal. = ______ KWH

If you use ______ gallons per week, you use approximately 52 times that per year, or ______ gallons.

Calculate the energy cost for a year's consumption:

____________ gallons x .25 KWH/gal. = ______ KWH

This is __________ KWH for one year.

Find out the rate in your area for electricity per KWH and determine the cost of one year's hot water consumption.

____________ KWH x ____ cents/KWH = $ __________

yearly energy consumption for hot water; rate

assignment

Continued

GAS WATER HEATER

_________ gallons x 1.3 cu. ft./gal. = ________ cu. feet

If you use _______ gallons per week, you use approximately 52 times that per year, or ________ gallons.

Calculate the energy cost for a year's consumption:

_________ gallons x 1.3 cu. ft./gal. = cu. feet

This is ________ MCF (cu. ft. divided by 1000) for one year.

Find out the rate in your area for natural gas per MCF and determine the cost of one year's hot water consumption.

___________ MCF x _____________ = $

yearly energy consumption for hot water

rate/MCF

How could you save money and energy for hot water at your house?

Some things to look for if your hot water consumption is high:

1. Check your water heater's thermostat - it should be set at 140°F. or less.
2. Check for leaks.
3. Are the hot water pipes insulated?
4. Install flow restrictors and/or water saving shower heads.

Suggestions:

1. Students should bring in their tallies of frequencies from home and do the calculations as a class.
2. All of the figures and calculations in this activity are based on averages and estimates and do not indicate actual hot water use.
3. Students should list ways their families might conserve hot water usage.
4. Students could undertake a family project to cut water usage by 10-15-20 per cent during a given time period. i.e., one month, six months.

Adapted from An Energy Education/Conservation Curriculum Guide, field testing draft 1977, University of Tennessee

assignment

1. A normal temperature setting for a water heater is:

   a. 110° F.
   b. 140° F.
   c. 100° F.
   d. 130° F.

2. A separate water heater for a bathroom should be set at ___________ to save energy.

   a. 110°-120° F.
   b. 140°-150° F.
   c. 100°-110° F.
   d. 130°-140° F.

3. Give an example of how to conserve water in the shower.

4. Give an example of how to conserve water in the toilet.

assignment

Answer Key to Assignment Sheet

1. (b)140° F.
2. (a)110°-120° F.
3. See B. 1. a, b and c on outline Background Information
4. See B. 1. a, b and c on outline Background Information

unit of instruction:

Lighting

subject area:

Housing and Home Furnishings

suggested for:

Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

Upon completion of this unit the student should be able to devise a home lighting plan that is both useful and conserves energy. This knowledge will be evidenced by completion of activities and by scoring 75% or better on a written quiz.

SPECIFIC OBJECTIVES

Student will:

1. Distinguish between the different types of lighting and the purpose of each.
2. Suggest methods to cut back energy consumption through home lighting.
3. Demonstrate the relative energy efficiency of fluorescent and incandescent lighting.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES - See Assignments Attached

EVALUATION TECHNIQUES

After completion of assignments students will be able to efficiently conserve energy in home lighting.

SUGGESTED MATERIALS AND RESOURCES

"The Light Book - How to be at Home with Lighting", General Electric, Cleveland, Ohio

Contact your local utility company and/or local land grant (state) university

DEVELOPED BY

Sharon Stucka

background information

I. Lighting

While lighting is only a small percentage of your total utility bill, there are many ways it can be improved.

A. Three general types of lighting needs - use proper lighting for assignment. It saves energy in the end!

1. General - 5-10 Foot Candles*

   * A foot candle is the amount of light on a surface one foot from a candle.

   a. Television viewing
   b. Hallways
   c. Stairs
   d. Closets
   e. This type of lighting is needed mostly for eye comfort's convenience.
   f. Needed in order to move easily through a room.

2. Task Lighting - recommended foot candles

   a. 10-20-card playing
   b. 20-30-casual reading, easy sewing, facial makeup
   c. 30-50-household activities in kitchens, laundry
   d. 40-70-prolonged reading or study, machine stitching, musical activities, shaving.
   e. 100-200-fine sewing, hobbies with small details
   f. Make sure you have a light fixture or portable lamp that gives you enough light for the work being done but does not glare or hurt your eyes.

3. Special Purpose

   a. Security or safety lighting - This lighting is required for either security or special hazard areas where you need lighting at specific levels to ensure your own safety.

   b. Accent or decorative lighting - Creates focal points, emphasizes pictures, art objects and other cherished possessions; adds the personal and distinctive touch.

B. Practical Energy Saving Tips with Lighting

1. Turn all lights off when not in use.

2. Use fluorescent lights whenever possible. They produce about four times as much light per watt as incandescent lights. (Note: Basements are ideal places to convert to fluorescent light.)

3. Choose the right size and type of light bulb for the lighting job. One 150 watt bulb is more efficient than two 75 watt bulbs.

background information

Continued

4. Use the right wattage bulb for the fixture. If the fixture calls for a 60 watt and you install a 100 watt, the additional heat produced may cause damage to the fixture and shorten the life of the bulb.
5. Install dimmer switches in those areas where they will benefit your needs.
6. Install permanent timers on outside lights. Use inside timers for lights when the family is away.
7. Reduce or eliminate ornamental lighting.
8. When decorating, use light colors on walls, floors and ceilings. They reflect more light into the room. Dark colors absorb light and will require higher levels of light input.
9. Clean all lighting fixtures to maintain their efficiency.

assignment

Level I

1. Take the students on an in-school walking field trip and point out fluorescent and incandescent bulbs. Then have them go home and identify the types of lighting they have in their own homes.

2. Have them keep a tally of how many times they see lighting waste energy at home. Then have them share conservation hints with their families and again keep a tally. (Amount of time is up to you.) Afterwards, discuss if there was improvement. If not, possible reasons why.

3. Have the students design and make a bulletin board (either for your room or for a grade school) on how to conserve energy through lighting.

Level II

1. Fluorescent vs. Incandescent Lighting Activity HF 3-5.

2. Since lighting is something even small children can help conserve, have the student create a puppet show that will help younger children understand ways they can conserve by turning off lights, etc. Have them construct puppets and give the puppet show at a local grade school, etc.

3. Give the students a floor plan with specific purposes and tasks for each room. Have them determine the type and how much lighting is needed.

assignment

Fluorescent vs. Incandescent Lighting

Objective: To demonstrate the relative energy efficiency of fluorescent and incandescent lighting.

Wattage is not a measure of the amount of light given off by a light bulb, but how much energy is required to operate it. The amount of light it provides is indicated in lumens. Bulb packages should give not only the wattage required, but also the lumens produced by the bulb. Using bulb packages, compare several incandescent and fluorescent bulbs for efficiency (lumens per watt).

For example: A 100-watt incandescent bulb may yield _____ lumens which gives the bulb an efficiency of 1750 lumens per watt:

$$\frac{1750\text{ lumens}}{100\text{ watts}} = 17.5\text{ lumens per watt}$$

Determine the efficiency of the following bulbs, plus any others you may have:

A. 100 watt fluorescent bulb: $\frac{\_\_\_\_\_\text{ lumens}}{100\text{ watts}}$ = _____ lumens per watt

B. 40 watt fluorescent bulb: $\frac{\_\_\_\_\_\text{ lumens}}{40\text{ watts}}$ = _____ lumens per watt

C. 100 watt incandescent bulb: $\frac{\_\_\_\_\_\text{ lumens}}{100\text{ watts}}$ = _____ lumens per watt

D. 25 watt incandescent bulb: $\frac{\_\_\_\_\_\text{ lumens}}{25\text{ watts}}$ = _____ lumens per watt

1. Which type of lighting is more efficient - incandescent or fluorescent?

   ____

2. Is it more efficient to buy four 25-watt or one 100-watt incandescent bulb? ____

From _An Energy Education/Conservation Guide_, University of Tennessee, field testing draft 1977.

assignment

Fill in the blank:

1. The three types of lighting are ______________, _______________, and _________________.
2. Choose the right __________ and _________ of light bulb for the lighting job.
3. Reduce or eliminate __________________ lighting.
4. Use _______________ lights whenever possible. They produce about four times as much light per watt as _________________ lights.
5. A ________________ candle is the amount of light one ____________ from a candle.
6. Tell in your own words two ways to reduce energy consumption of lighting in your own home.

assignment

Suggestions:

1. Ask the school maintenance supervisor for empty fluorescent light bulb boxes. The information you need is on the box, not the bulb.
2. Have students bring in bulb boxes from home.
3. Check at home for the use of multiple low wattage bulbs where a larger wattage bulb might be used to save energy. But remember, a larger wattage bulb gets hotter during operation and some fixtures are not designed for the larger wattage bulbs.
4. Discuss the comparative lifetimes of fluorescent and incandescent bulbs.
5. Discuss the turning off and on of incandescent and fluorescent bulbs.

Answer Key to Assignment Sheet

1. General, Task, Special Purpose
2. Size, type
3. Ornamental
4. fluorescent, incandescent
5. foot, foot
6. Suggestions should include:
    a. Lighting for the specific purpose (general, task or special) Don't over-light.
    b. Turn off lights when not in use.
    c. Use fluorescent as opposed to incandescent.
    d. Choose the correct wattage bulb for maximum effectiveness.
    e. Possible installation of dimmer switches and timers.
    f. Reduce or eliminate ornamental lighting.
    g. Keep fixtures clean to maintain efficiency.
    h. Use light colors on the walls, they reflect more light.

unit of instruction:	**subject area:**	**suggested for:**
Appliance Energy Usage	Housing and Home Furnishings	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

Upon completion of this unit, the student should be able to point out various ways in which to conserve energy when using appliances and calculate how much energy appliances use. This knowledge will be evidenced by completion of suggested activities and by scoring 75% or better on the written quiz.

SPECIFIC OBJECTIVES

Students will:

1. List ways in which to conserve energy for televisions and radios.
2. Demonstrate the extent of use of entertainment devices and their impact on energy use.
3. Give general examples of energy conservation that can be applied to many appliances.
4. Estimate the amount of energy consumed by a given appliance over a given length of time and translate that into dollars spent.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES - See Assignments Attached

EVALUATION TECHNIQUES

After completion of assignments, students will be able to evaluate energy conservation in entertainment appliance usage.

SUGGESTED MATERIALS AND RESOURCES

Contact your local utility company.

Use any assorted books or manuals that come with appliances.

DEVELOPED BY

Sharon Stucka

background information

I. Appliance Energy Usage

A. Television and Radios

1. When no one is listening to the radio or watching the television, turn them off.

2. "Instant-on" television sets draw electricity 24 hours a day. Some sets have switches to turn off the instant-on feature during hours when not in use. If you do not have this feature, unplug the television set.

3. If buying a new television set, look for the solid state type. It uses less power than older tube type. Color sets use more electricity than black and white.

4. Use fewer lights when watching television.

B. General Tips

1. Become thoroughly familiar with the operation of all your appliances. Read the "use and care" book to make sure you are not wasting energy by using the appliance incorrectly.

2. Don't overload electrical circuits. Overloading results in reduced energy efficiency. If you're unsure of circuit capacity or attached load, call your electrician.

3. Don't put off needed repairs. Worn parts may increase energy use needlessly as well as putting excessive wear on the appliance.

4. Use a small appliance (or elbow grease) in place of major appliance whenever possible. It uses less energy.

C. Cost of Running Various Appliances - "Which Costs the Most?" HF 4-4 - 4-6 Level II only. (Note: Pick especially the appliances related to interior, i.e. #3, 5, 6, 7, 8, 9 and 14; as opposed to kitchen appliances.)

assignment

Level I

1. Have students do a tally in their homes of how many times they find a television on and no one watching it or both a television and radio on, etc. Then have them try to cut down on the numbers recorded on the tally.

2. Demonstrate the use of small appliances such as crock pots, broiler ovens, electric fry pans and elbow grease such as mixing a cake by hand, etc. as opposed to larger appliances. Give students actual hands on experience with these things in a laboratory setting.

Level II

1. Entertainment Practices Activity HF 4-7.

2. Have students write a manual for a new electric appliance that mixes, slices, chops, fries, shreds and toasts. These specifics aren't as important as the general hints that should be included to apply to almost every electrical appliance and energy conservation. Have them share their ideas with one another.

Answer Key to Assignment Sheet HF 4-8

1. Solid state
2. Lights
3. Repairs, increase
4. c

assignment

Which Costs the Most?

Due to the different power requirements (watts) of household appliances, some cost more to operate per hour than others. Time: 30 minutes. Materials: Worksheet #1 and Worksheet #2, overhead projector, chalkboard.

Procedure:

1. Make a spirit master of Worksheet #2.
2. Make a transparency of Worksheet #1.
3. Explain the concept of a "mill" (.001 of a dollar).
4. Ask students to choose 10 appliances they "need" in their homes.
5. Instruct them to plot a histogram of the cost per hour vs. the ten appliances, using Worksheet #2.
6. Make a "class data" composite histogram on the chalkboard listing the ten most expensive appliances per hour of operation.
7. How could money and energy be saved in the future use of each appliance?

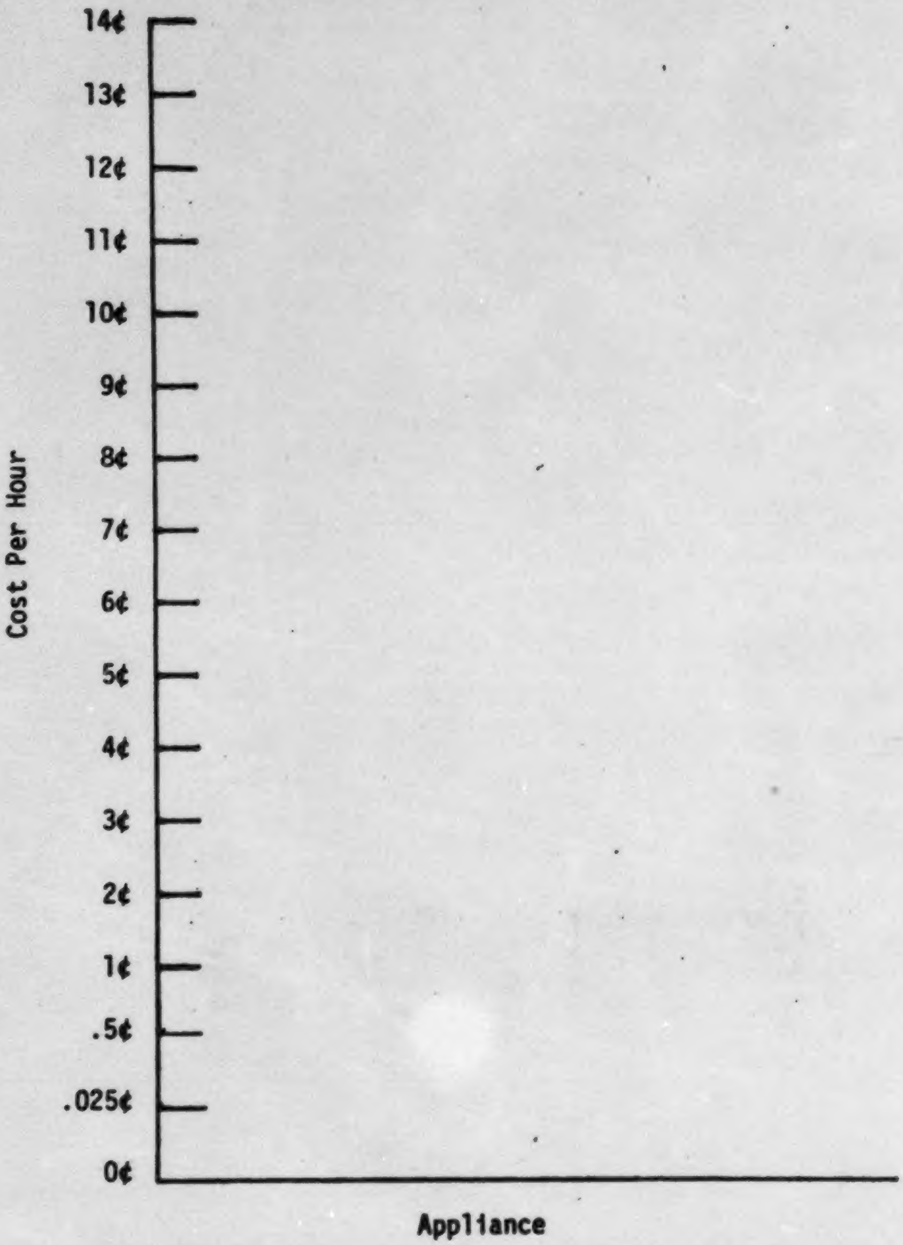
Reference: Adapted from Energy Activities for the Classroom, ERIC Center for Science, Mathematics, and Environmental Education, College of Education, The Ohio State University, 1976. pp. 23-24.

WORKSHEET #1

Cost of Electricity for One Hour of Use

1.	Toothbrush	$ .0002 (2 hundredths of a cent)
2.	Toaster	.04
3.	Electric Water Heater:	
	Tub Bath	.09 - .14
	Shower	.07 - .115
	Automatic Washer	.17
	Dishes by Hand	.02
	Dishwasher	.09 - .14
4.	Freezer	.005 (½ cent)
5.	Lights:	
	Incandescent - 100 watt	.0038
	Fluorescent - 40 watt tube	.0019
6.	Record Player	.004
7.	Air Conditioning	.038
8.	Radio	.002
9.	Television:	
	Black and White:	
	Solid State	.002
	Tube	.006
	Color:	
	Solid State	.007
	Tube	.01
10.	Range	
	Large Surface Unit	.038
	Small Surface Unit	.02
	Bake	.02
	Broil	.13
11.	Dishwasher	.045
	Hot Water	.14
12.	Refrigerator/Freezer - 14 cu/ft:	
	Frostless	.008
	Manual	.005
13.	Microwave Oven	.05
14.	Clock	.007

WORKSHEET #2



assignment

Entertainment Practices

Objective: To demonstrate the extent of use of entertainment devices.

Teenagers and young adults are often abusers of entertainment devices. In one household as many as four or five devices may be operating at the same time. Take a survey of the students at your school to determine the extent of their use of entertainment devices. Use the following form:

Device	Hours of Use Per Day	or Hours of Use Per Week
Black and white TV		
Color TV		
Radio		
Tape player		
Stereo		
Electric Instrument		
Model trains or cars (electric)		
Electric games		
Slide projector		
Movie projector		

From your survey calculate the average hours of operation for a year for one student. To do this, take the total hours a week of all those surveyed and divide by the number of students surveyed. This yields the average hours of operation for one week. Then multiply by 52 (52 weeks in a year).

$$\frac{\text{Total hours per week}}{\text{Number of students surveyed}} = \underline{\hspace{4cm}} \text{ average/week}$$

____________________ average/week x 52 = ____________ average/year

Now use the total number of students in your school to estimate the total hours of operation of entertainment devices for one year.

____________________ average/year x ____________ number of students in your school =

____________________ operation per year of entertainment devices by your school's students.

It might also be enlightening to determine the quantity of records and tapes the students at your school purchase in a year. Remember, tapes and records are petroleum products.

Suggestions:

1. Randomly survey at least 25 students.
2. The hours of use per day should be recorded for very frequent use and then converted to hours per week.
3. Publicize your results and offer suggestions for reducing this energy use.
4. Survey entire families.
5. This activity makes a good class project. Do calculations on the board.

From An Energy Education/Conservation Guide, University of Tennessee, field testing draft 1977.

assignment

1. When buying a television set, look for one that is ________ _______. It uses less energy.

2. Use fewer ______________ when watching television.

3. Don't put off needed ______________. Worn parts may _______________ energy use.

4. With regard to all the appliances we use, which of the following hints would not help save energy:

    a. Read the "use and care" booklet to become thoroughly familiar with the operation of your appliance.

    b. Be sure to clean filters, etc. and make any necessary repairs.

    c. Plug as many appliances into a circuit as possible to achieve maximum use from that outlet.

    d. Use a smaller appliance whenever possible.

unit of instruction:	**subject area:**	**suggested for:**
Floor Coverings	Housing and Home Furnishings	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

Upon completion of this unit, the student should be able to show ways to reduce heat and energy loss through the floor. This knowledge will be evidenced by completion of suggested activities and by scoring 75% or better on a written quiz.

SPECIFIC OBJECTIVES

Student will:

1. Define R-value and be aware of its importance in insulation and energy conservation.
2. Explain the advantages of carpeting as an energy conserving floor covering.
3. Select the type of floor covering that provides optimum insulation for the situation.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES - See Assignments Attached

EVALUATION TECHNIQUES

After completion of assignments, students will be able to evaluate the various insulating benefits of different floor coverings.

SUGGESTED MATERIALS AND RESOURCES

Contact your local utility company and/or local land grant (state) university.

DEVELOPED BY

Sharon Stucka

background information

I. Carpeting

A. Uncovered and uninsulated floors are a source of heat loss.

B. A dense, thick pile will provide the highest insulating value.

C. The proper cushion under your carpet can enhance its insulating value and extend the life of your carpet.

D. Carpeting is a "psychological" insulator, which can make "dialing down" your thermostat much more acceptable because your feet aren't constantly cold.

E. R-values of floor coverings. (R-values is the resistance to heat transfer. The higher the R-value, the greater the insulating quality.)

a. Tile, linoleum, vinyl, rubber - .05
b. Terrazzo - .08
c. Cork tile - .28
d. Hard wood flooring - .68
e. Concrete block - .71
f. One cubic inch carpet fibrous pad - 2.08

F. Eliminate unnecessary floor polishing and vacuuming. Make sure the vacuum bag is not overloaded.

assignment

Level I

1. Have the students take a survey of what rooms (and how many of each) are carpeted in a home. This can be a survey of your own classroom, or they can go out and survey other students. Also have people give comments on what they like or dislike about that particular room. Does it have anything to do with the floor covering? Discuss and evaluate the results.

2. Have two volunteers role play waking up on a cold winter morning and getting out of bed. One has a linoleum floor and the other a carpeted floor. What are their reactions? Discuss as a class the psychological impact of carpet as an insulator.

Level II

1. Have students do a comparison of costs between various types of floor coverings. Discuss findings.

2. Take a field trip to a floor covering store to see first hand all of the possibilities available.

3. Have the students design an experiment (use students outside the class as participants) to see if there is a psychological insulator effect, i.e. two rooms, same temperature, but different colors, one carpet, the other not, etc. Discuss the results.

4. Have different samples of carpeting, padding, flooring, tile, etc. (Maybe real samples or pictures). Have students, in groups, rank in order the best insulators to the worst. This could be used as an introduction.

Answer Key to Assignment Sheet HF 5-4

1. cushion

2. higher

3. R-value is the resistance to heat transfer

4. Comparison should include:
   a. Carpet has a greater R-value than linoleum (a pad makes it even better).
   b. Psychologically a carpet may make the room seem warmer, especially your feet and that may help to lower the thermostat.

assignment

Fill in the blanks:

1. The proper __________________ under your carpet can exhance its insulating value and extend the life of your carpet.

2. The ____________________ the R-value, the greater the insulating quality.

3. Define R-value.

4. Compare a linoleum floor to a floor covered with carpet as far as energy is concerned.

unit of instruction:

Window Treatments

subject area:

Housing and Home Furnishings

suggested for:

Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

Upon completion of this unit, the student should be able to analyze the role of window treatments in energy conservation. This knowledge will be evidenced by completion of suggested activities and by 75% or better on a written quiz.

SPECIFIC OBJECTIVES

The student will:

1. Design a window treatment that would be both decorative and energy saving.
2. Distinguish between the various advantages of the different types of window treatments.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES - See Assignments Attached

EVALUATION TECHNIQUES

After completion of assignments, students will understand various methods of conserving energy through insulating window treatments.

SUGGESTED MATERIALS AND RESOURCES

Contact your local utility company and/or local land grant (state) university.

DEVELOPED BY

Sharon Stucka

background information

I. Window Treatments

A. When building a new home or an addition, use the minimum glass area compatible with your design.

B. An energy conserving window treatment must trap air between itself and the window. If no sun, keep them closed!

1. During the winter, uncover your windows during the day and allow the sun's heat to enter.

2. Tightly fitting window accessories will help keep the heat in.

3. The same window accessories can act as shields against summer heat gain, lessening the need for air conditioning.

C. Shades

1. Cover a window tightly when it's not collecting heat. Window shades can do this job economically and decoratively.

2. The closer a shade fits a window the better and it prevents heat from escaping.

D. Shutters

1. One of the best ways to reduce a window's heat loss is to fit it with insulated shutters.

a. The shutter will consist of a 3-layer sandwich with a mineral-wool core and a hardboard covering on each side.

b. The core can be as thick as you wish, although the thicker it is, the better for insulating purposes.

E. Draperies

1. Use material that is heavy, closely-woven and lined.

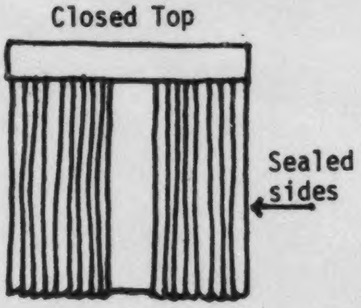
a. Lined draperies can reduce window heat loss by 20 percent.

2. To eliminate any loss of warm air past cold glass, drapes should fit snugly against the wall at the top and on the sides of the window. They should also drag slightly on the floor.

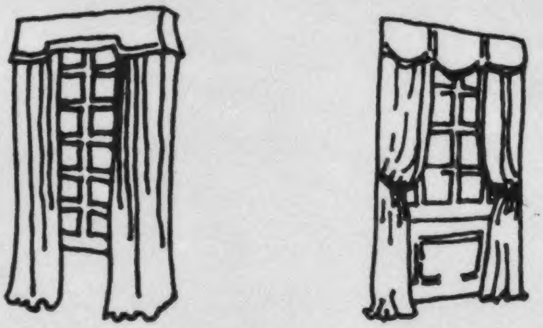
a. Valances - covered with fabric or wallpaper can help eliminate formation of drafts that are caused by warm air drawn over drapery tops, cooled on the glass and then moved back into the room under the drapery.

background information

Continued



Closed top and sealed sides help prevent air leakage.



Treatments such as these are excellent for sealing out air; they are appropriate for Queen Anne, Chippendale or Federal styles.

b. Where the register is directly below or above the window, retrofit deflectors are readily available which divert the air into the room rather than up or down the window surface.

3. Low Budget - Energy saving materials for draperies you can make

    a. Budget blankets

    b. Mattress pads

    c. Bed sheets

4. Drapery Linings

    a. Inhibit deterioration to the drapery caused by sunlight.

    b. Provide an additional barrier to the sun's rays in the summer.

    c. Help to reduce heat loss in the winter.

    d. Some drapery fabrics have a "self lining".

        1. Satin face woven on the back of the fabric.

        2. New acrylic foam backed, very thin, forms a barrier against light and to some extent against outside noises and air around the window.

    e. Insulative linings are available in several types:

background information

Continued

1. Plastic or vinyl which may be either clear or opaque and serve mainly as a barrier to air and moisture.
2. Fabric coated with vinyl.
3. Silver backed fabric which is particularly valuable in reflecting the sun's rays as well as serving as a barrier to air and moisture.
4. A foam-backed fabric that has the added benefit of increased thermal performance and acoustical insulation.
5. Average Window Heat - Loss Savings of Accessories Drapery Factors*

	Percentage
a. Pull shade	10
b. Unlined drape	20
c. Unlined drape plus shade	25
d. Lined drape	30
e. Lined drape plus pull shade	35

*These factors assume that the drape is closed 12 hours a day in winter.

Adapted from "Window Wizardy", Cathy Eberlein, Energy Horizons,
1999 Shepard Road, St. Paul, Minnesota 55116., Fall 1978.
Midwest Gas Association

assignment

Level I

1. Have the students unscramble these words that have to do with window treatments and energy conservation:

   Words Scrambled

Shades	reradseip
Draperies	anolniistu
Shutters	aehssd
Lining	ecaalvn
Insulation	usshetrt
Valance	ginínl

2. Supply the students with magazines. Have them cut out pictures of window treatments. Then have them show their pictures and give suggestions on how they could be more energy conserving.

Level II

1. Have students analyze the window treatments in their own home and make suggestions on how to improve them as far as energy conservation.

2. Design and fabricate a window treatment HF 6-6.

Answer Key to Assignment Sheet HF 6-7

1. Shades, shutters, draperies

2. Selection could include shades, shutters or draperies. Basic thrust should be that the treatment traps air between itself and the window.

   The same accessory can reduce heat loss in the winter and heat gain in the summer. For specifics of each treatment refer to background information on Window Treatments.

3. itself, the window

4. uncover

5. Explanation should include use of linings, valances, snug fit, and deflectors if a heat vent is located near the window.

assignment

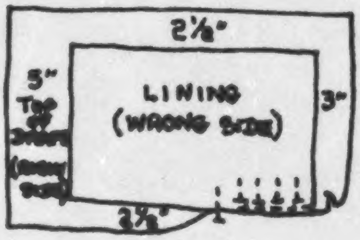
Design and Fabricate a Window Treatment

Objective: To design and fabricate an energy conserving window treatment.

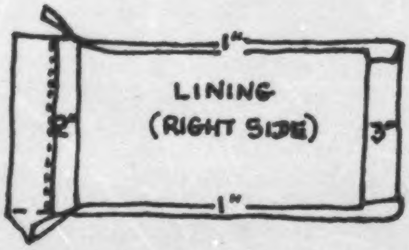
One of the least expensive and most effective window treatments for the conservation of energy is an insulated drapery. The major differences between a standard drapery and an energy-conserving drapery are a tight fit and insulative lining. Standard drapery construction guides should be followed in making energy-conserving draperies, but make certain that they include returns to the wall, a 4-inch overlap, and full length from ceiling to floor if possible. A cornice may be used to reduce convection air flow over the top of the drapery. Then substitute insulative lining for the standard lining. Insulative lining is available in several types: (1) plastic or vinyl which may be either clear or opaque and serves mainly as a barrier to air and moisture; (2) fabric coated with vinyl; (3) silver backed fabric which is particularly valuable in reflecting the sun's rays as well as serving as a barrier to air and moisture; and (4) a foam backed fabric which has the added benefit of increased R-value and as an acoustical insulator.

Included for your convenience is a step-by-step illustration for making lined drapery.

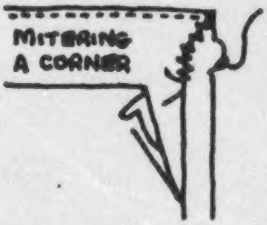
Step 1



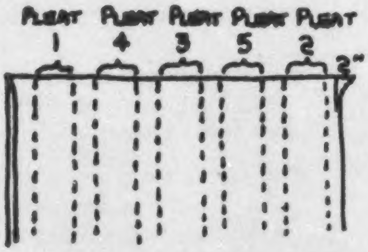
Step 2



Step 3

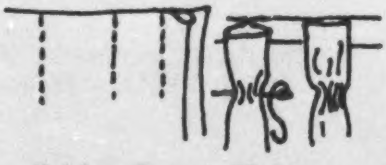


Step 4



Placement of Pleats

Step 5



Making French Pleats

assignment

1. Name the three basic types of window treatments.

2. Select a window treatment and explain how it can be incorporated into an energy saving plan for a home.

Fill in the blanks:

3. An energy conserving window treatment must trap air between ________________ and ________________.

4. During the winter, ___________________ the windows during the day if the sun is shining.

5. Explain how draperies, by certain additions, can be even more energy conserving.

background information

I. Actual Decor

A. Try to use cotton and woolen materials for furnishing as they require less energy for processing. (However, make sure that they will not require a great deal of energy consuming care).

B. Place furniture so it does not block heat registers or outlets. Dust or vacuum the air vents often.

C. Psychological effects

1. The room that looks warm will make the occupant feel warm.
2. Even if "warm" decor works only in the mind's eye, if it saves fuel dollars, it becomes very real.
3. Color plays both a real and an illusory part in how we feel. Light colors, which actually reflect the sun's rays, give a cooling effect.

D. New Products*

1. A covering very similar to interfacing applied to walls to give added insulation.
2. A latex-based priming paint to seal walls against moisture and thus enhance effectiveness of inner wall insulation.

* At the time of this writing, the first product is experimental. Be aware of current developments.

unit of instruction:	subject area:	suggested for:
Interior Decorating	Housing and Home Furnishings	Level I (Junior Hig Level II (Senior High)

UNIT OBJECTIVE

Upon completion of this unit, the student should be able to explain how interior decorating can have an effect on energy consumption. This knowledge will be evidenced by completion of suggested activities.

SPECIFIC OBJECTIVES

Student will:

1. Explain how the room arrangement and psychological factors affect energy conservation.
2. Be aware of new developments in interior decorating and energy conservation.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES - See Assignments Attached

EVALUATION TECHNIQUES

After completion of assignments, students will be able to evaluate energy conserving techniques in interior decorating.

SUGGESTED MATERIALS AND RESOURCES

Interior Decorating textbooks

Contact your local utility company and/or your local land grant (state) university

DEVELOPED BY

Sharon Stucka

assignment

Level I

1. Show students different colors and ask them to describe the feelings each color evokes. As a group discuss how the psychological effects of color could work in a room.
2. Have the students check their own homes to see if any major vents or outlets are blocked by furniture. Then have them decide if there are alternative furniture arrangements that are suitable.

Level II

1. Have the students design (or invent) a new product that would conserve energy in the interior of the home. Be sure they explain how it is an energy saver.
2. Supply the students with floor plans and furniture templates. Give them locations of vents, sunny windows, etc. Have them arrange the room for optimum energy conservation. (If you have any of the kits with floor plans and 3-D furniture blocks, this is even better!)

unit of instruction:

Home Heating

subject area:

Housing and Home Furnishings

suggested for:

Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

After completion of this unit, the student should be able to determine where heat losses may occur in existing homes and some methods of reducing these heat losses. The student should be able to identify the types of heating systems and some advantages and disadvantages of each.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Define energy conservation.
2. Match terms associated with energy efficient housing to their correct definitions.
3. Know where heat loss occurs in a home.
4. List methods of reducing heat loss in existing homes.
5. List the factors affecting the amount of energy consumed by home heating and cooling systems.
6. Identify the differences between active solar and passive solar energy sources.
7. Identify types of heating and cooling systems used in different areas of the United States.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES - See Assignments Attached

EVALUATION TECHNIQUES

1. Give student exam over information sheets.
2. Evaluate assignment sheets.
3. Compare student energy audits of their homes in class.
4. Have students identify ways they can conserve heat in their current home situations.

SUGGESTED MATERIALS AND RESOURCES - See Housing and Home Furnishings Resources

DEVELOPED BY

Judith Johnson

background information

1. **Energy Conservation** - Keeping amount of energy consumed to a minimum by utilizing methods that will allow maximum use of available energy without needless wasting.

II. Terms and Definitions:

A. R-Value - shows the heat retarding ability of a product. It is the mass thermal resistance of the product. The greater the R number, the greater the insulating value.

B. Home orientation to site - positioning the house on a site in order to gain maximum passive solar energy and to minimize exposure to cold winds.

C. Deciduous tree - a tree which loses its leaves in the fall.

D. Coniferous tree - a tree that keeps its foliage all winter, such as evergreen shrubs and pines.

E. Thermal - environmental temperature.

F. Thermostat - device used to regulate heating and cooling system within a home.

G. Active solar systems - involve collectors, pumps or ducts, and storage units.

H. Passive solar systems - collect the sun's energy more by design and orientation than with the use of hardware.

- By opening drapes of windows to the south and west of your home you can collect solar heat.

III. Home Heating and Cooling Systems: The home's biggest energy consumer.

A. Factors affecting the amount of energy consumed by home heating and cooling systems.

1. Changes in outdoor temperature

   - the lower the outdoor temperature the greater the heat loss.
   - the more hot and humid the summer, the greater the amount of air conditioning required.

2. Structural components of the house

   - doors
   - windows
   - walls
   - ceilings and attic
   - floors
   - fireplaces

3. Family size, structure and habits

   - how often doors are opened and closed to outside air.
   - how much time is spent within the home and how rooms are used.
   - family members values and special needs.

background information

Continued

4. Orientation of home to its site
   - orientation of rooms to the sun for the purpose of using a passive solar system.
   - protection from cold winds by dense tree growth on north and northwest sides.
   - trees on south and west to shade home from summer sun.
5. Lowering thermostats in winter and raising in summer
6. Checking operating condition of furnace
   - change filters every few months.
   - service fan and motor periodically.
   - be sure drapes and furniture do not block heating ducts.
   - check the distribution system for air leaks.

B. Where heat loss occurs

1. Through uninsulated or poorly insulated walls, ceilings and floors.
2. Through and around windows and doors.
3. Cold air infiltrates into home through any cracks or spaces open to outside.
4. Up fireplace chimneys.
5. Through cement slabs on grade.
6. Around foundations exposed to outside.
7. Through vents and ducts.

IV. Methods of Reducing Heat Loss in Existing Homes

A. Adding insulation to attic.
B. Installing storm windows and doors.
C. Weatherstripping around windows and doors.
D. Caulking cracks both inside and outside of home.
E. Covering fireplace openings with glass screens.
F. Insulating garage walls and ceilings if rooms are adjacent to these.
G. Planting coniferous trees on north to northeast sides of home to break cold winds and planting deciduous trees on south or west to shade home in summer.

V. Types of Heating Systems Available

A. Forced air gas furnace
B. Coal furnace (new type)
C. Electric baseboard heat
D. Electric heat pump
E. Electric radiant ceiling heat
F. Hot water heat
G. Wood-burning stove
H. Oil burning system
I. Solar heating systems
J. Fireplaces

background information

Continued

- Close drapes when the sun is not shining and at night.
- When building a new home, orient the most used daytime rooms toward the sun (south and southwest).

VI. Cooling Systems

A. Air conditioning

1. Central air
2. Room air conditioner
3. Attic fans
4. Heat pump (heats in winter; cools in summer)

assignment

Level I

1. Design a bulletin board showing the types of heating systems. Color code by cost or efficiency. Which gives the most warmth for the amount of energy it consumes?

2. Interview a homeowner and report the reaction to the following questions:
   a. How do you feel about the cost of your heating bill?
   b. Do you believe there is a shortage of fuel?
   c. What would be your suggestion for solving the energy crunch?

   Hold class discussion following this activity.

3. See Assignment #2 - "Make Your House Snug and Cozy". Include insulation, caulking and weatherstripping ideas.

4. Read "The Nightmare Life Without Fuel," Issac Asimov, Time, April 25, 1977. Have the students write an essay based on how we could prevent Asimov's scenario from becoming reality.

Level II

1. Give students unit objectives.
2. Give students background information sheets.
3. Invite architect or engineer to speak to class on calculating heat loss of a home (see assignment #1).
4. Have students research individually or in groups the advantages and disadvantages of one of the types of home heating or cooling systems - report findings to class.
5. Have students do energy audit of their current living quarters.
6. If possible, take field trip to areas where solar heat is in use and have the person in charge explain the concept of solar heating, its cost and feasibility. One of your students may even live in a solar heated home.
7. Ask each student to report on the warmest room in their house and give reasons why it seems to be the warmest.
8. Have students report on the coolest room in their home and give reasons.
9. Invite a speaker from your local utility company to share information on winterizing the home.
10. Select from a list factors that affect the amount of energy used by home heating and cooling systems.

assignment

#1

Calculate Heat Loss of a Home

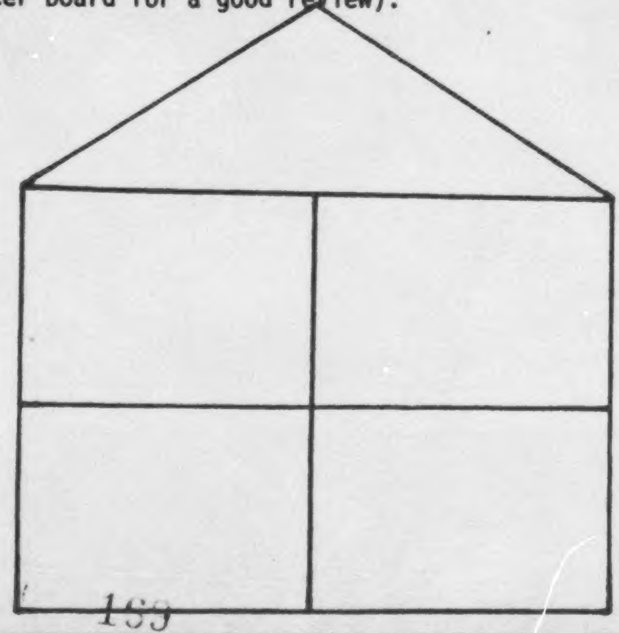
(This assignment is also used in Unit 11 on Windows. Heat loss of windows should be calculated at the same time.)

Invite an architect or engineer to help the class to calculate heat loss of a home. Use the learnings to calculate heat loss in your current home. Report the findings below and figure the amount of BTUs required to keep the home at 68°.

#2

Make Your Home Snug and Cozy

Your teacher has presented ideas to you on the ways to conserve energy by constructing a home with certain features. On the drawing below sketch the features that you would use and where you would put them in order to have a snug and cozy house. (This can be done in small groups on large poster board for a good review).



unit of instruction:
Insulation

subject area:
Housing and Home Furnishings

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

After completion of this unit, the student should be able to list the types of insulation used in homes and determine where to use this insulation.

SPECIFIC OBJECTIVES

After completion of this unit the student should be able to:

1. List the types of insulation
2. Identify the characteristics of insulation
3. Determine where a home should be insulated
4. Identify minimum requirements needed for energy conservation in new home construction

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES - See Assignments Attached

EVALUATION TECHNIQUES

1. On teacher-prepared diagram, have students shade in areas to be insulated for effective combat of heat loss.
2. Determine if students are able to list the types of insulation and the characteristics of each on a written quiz.
3. Have students identify the minimum requirements needed for energy conservation in new home construction on a written quiz.

SUGGESTED MATERIALS AND RESOURCES - See Housing and Home Furnishings Resources

DEVELOPED BY

Judith Johnson

background information

I. Definitions

   A. Insulation - material used in the construction of a home to prevent or minimize the flow of heat.

   B. Vapor barrier - water proof material placed on the warm (heated in winter) side of walls, ceilings, floors in order to retain humidity.

II. Types of insulation used in homes - the primary purpose of home insulation is to resist the flow of heat, whether it is heat escaping from the house in winter or entering the house in summer. R-value tells you how well a particular type of insulation can resist heat flow.

   A. Loose fill (or blowing wool)

      1. Loose material stored in bags and blown into areas of the home by machine.

      2. Make sure product is an approved insulation and that you know the number of bags required to obtain a specific R-value.

      3. Usually best to obtain a contractor to do the work.

      4. If done properly, it should fill all spaces.

   B. Rigid board - in different thicknesses, lengths, widths and types.

      1. Used on exterior as sheathing.

      2. Can be used to cover existing siding if new siding is being added.

      3. If used on interior walls, rigid board should be covered with gypsum board 1/2 inch thick.

   C. Foamed in place

      1. Can be used in new construction and for insulating existing walls.

      2. Usually installed by a contractor.

   D. Batts and blankets

      1. Precut to fit specific areas.

      2. Packaged in rolls or stacked.

      3. Come with or without vapor barrier attached.

   E. Vapor barrier

      1. Waterproof materials used between the insulation and the warmed inside area of the home.

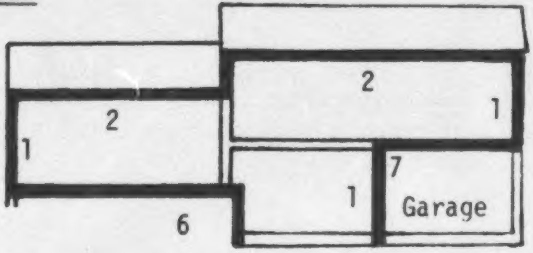
      2. Used to protect the insulation material from becoming moist, as moisture reduces its effectiveness.

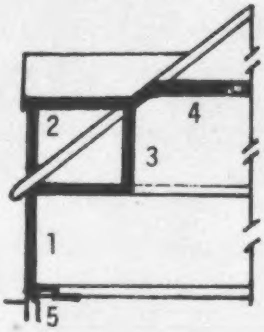
background information

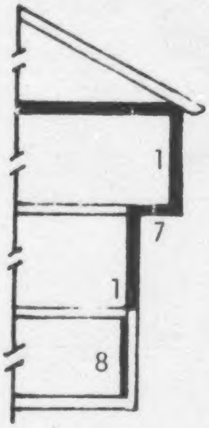
Continued

III. Where to insulate a home. (Numbers related to the diagram)

1. Exterior walls
2. Ceilings with cold spaces above dormer ceilings.
3. Knee walls when attic space is finished as living quarters.
4. Between collar beams and rafters.
5. Around the perimeter of a slab on grade.
6. Floors above vented crawl spaces.
7. Floors over an unheated or open space such as a garage or porch.
8. Basement walls when below grade space is finished for living purposes.







IV. Energy Saving Package for New Homes

A. Using at least minimum R-values in insulation

attic or ceiling	= R-30
sidewalls	= R-13
floor (over crawl space)	= R-19
floor (over garage)	= R-19
walls adjoining unheated area	= R-11

B. Adequate caulking and weatherstripping of spaces around doors, walls or windows.

C. Installation of vapor barrier.

D. Use of double glass on windows or use of storm windows and doors.

E. Use of proper heating units for size of home.

F. Fireplace with installation of outside combustion air and glass doors and damper.

G. Insulated foundations.

assignment

Level I

This unit is not recommended for Jr. High level unless used in conjunction with home heating. Students could then apply the information to assignment sheet "Make Your Home Snug and Cozy" in Unit 8.

Level II

1. Give student unit objectives.
2. Give student background information.
3. Visit a new home construction area where various stages of a home have been completed to observe the structural components used to conserve energy (see assignment #1).
4. Invite an area builder to talk with class about the current types of insulation on the market.
5. Have students do an insulation audit of their current dwelling to determine where insulation is used and where it could be added.

assignment

#1

Observe structural components of a house that make it a more energy conserving building.

Take a field trip to an area where new homes are under construction. Observe what kinds of insulation are being used and where it is applied. Check how a vapor barrier is used. Check to see what kind of weatherstripping is used and where it is used. Check to see if cemented areas are being insulated and how this is done. Check, also, to see if any pipes are insulated and how. Report your findings in a written summary below.

unit of instruction:
Caulking and Weatherstripping

subject area:
Housing and Home Furnishings

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

After completion of this unit, the student should be able to define caulking and weatherstripping and to demonstrate the application of each.

SPECIFIC OBJECTIVES

After completion of this unit the student should:

1. Define caulking and weatherstripping.
2. List the types of caulking compounds.
3. Apply caulking to cracks in a home.
4. List the types of weatherstrippings.
5. Apply weatherstripping to a door or window.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES - See Assignments Attached

EVALUATION TECHNIQUES

Teacher observation of student application of caulking and weatherstripping.

SUGGESTED MATERIALS AND RESOURCES

Check Units 8, 9 and 11 in Housing and Home Furnishings. Most of these resources will mention caulking and weatherstripping.

DEVELOPED BY

Judith Johnson

background information

I. Caulking

A tiny crack around the window frame might seem insignificant. But add up all the inside and outside cracks of windows, doors and other joints and you've opened the gates for energy waste.

What's responsible for this? Air infiltration. Air infiltration is air leakage that occurs both ways - whether it's air that comes in to reduce the home's comfort level, or "conditioned" air (hot or cold) that escapes to the outside.

Either way it ups energy consumption. So fill those cracks with caulking and weatherstripping - two sure methods that will improve your house's thermal envelope and your energy bills.

Caulking is for cracks around door and window frames, places where wood and brick siding meet, and joints between the chimney and siding. It should also be used where the house framing meets the concrete foundation and where water pipes, dryer vents and wires pass through walls. The best rule of thumb in applying caulking is any place where two different materials meet.

II. Caulking Compounds

There are several different types of caulking compounds that will do the job. Some last longer than others. Some are less expensive. And some are easier to apply. Still others come in attractive, decorator colors. Whatever your needs, keep these facts in mind when choosing a caulking compound.

Caulking Compounds	Durability	Comments
Acrylic Latex	5-10 years	Easy to apply. Water clean-up, paintable, good elasticity.
Butyl	5-10 years	Solvent clean-up required, skillful application needed, not paintable.
Silicone	20 years	Familiar as bathtub caulking. Most durable, not paintable, instructions should be followed carefully, skillful application needed. Colors are available.

Most of these caulking compounds are available at lumber yards, hardware stores and conservation centers. Other types of caulking are available such as oil base, polyurethane, foam-filled can, rope caulk and backer rod.

background information

Continued

III. Weatherstripping

Caulking's good companion is weatherstripping. It reduces air leakage around windows and doors where they meet the frame.

To check for leakage, run your hand along cracks where moving parts of a window or door come together. Any day good for kite flying is a good day for this test.

Don't forget to check doors between conditioned and unconditioned parts of the house such as doors to the garage, basement, workshop, crawl space openings and attic access doors.

Most weatherstripping materials are available at local hardware stores, lumber yards or conservation centers. And again, as with caulking, evaluate the different types and select one that fits your particular needs when making your choice of weatherstripping materials.

IV.

Weatherstrippings	Durability	Comments
Rolled Vinyl with rigid metal backing	5 years	Must make complete contact for proper seal
Foam Rubber	1-2 years	Easy to apply. Short life span.
Thin Spring Metal	5 years and up	May lose some flexibility time and therefore lose its sealing ability.

Weatherstripping should be checked every year for its condition. If installed correctly the first time, it will be effective for years.

Look for other types of weatherstripping such as vinyl bulb, interlocking threshold, door sweeps, etc.

Information from Public Service Company of Colorado

assignment

Level I

This unit is not recommended for Junior High use except as a resource when discussing home heat loss.

Level II

1. Give student unit objectives.
2. Give student background information.
3. Have a guest speaker from your local utility company give a talk on the benefits and methods of caulking and weatherstripping.
4. Have students do a home energy audit to determine where there are cracks and air leakage in their homes. Report findings to the class.
5. Have students apply caulking (assignment #1).
6. Have students apply weatherstripping (assignment #2).
7. Optional: Have student visit a new home site in which the sub-contractor is doing caulking and weatherstripping on the day of your visit.

assignment

#1

Caulking A Home or A School Room

Work with your parents, a neighbor or your landlord to see if they could help you to caulk all the cracks and spaces in the home (or apartment). Using small groups of two or three, work within your school or classroom and apply caulking to a window. Report back to the class or write a summary of your experiences. Following is an outline of the procedure you can use.

Caulking Surface Preparation and Application

Tools: 1" Scraper or Screwdriver
Wire brush
Caulking gun
Clean-up materials
Cloth
Ladder

Materials: Caulking compound, (1/2 cartridge per window), filler material (used to fill large cracks before caulking) such as backer rod, scraps of insulation or sponge rubber.

Follow these steps:

1. Clean all surfaces before caulking. Remove loose paint, dirt and grease. This insures good adhesion. Make sure surface is dry. (If you're replacing or repairing old caulking, remove as much old material as possible.)
2. Fill any deep or wide cracks with filler material.
3. Read the instructions on caulking cartridge V-E-R-Y carefully.
4. Cut the tube end at a 45° angle, puncture seal in nozzle of tube and apply evenly. With some caulking compounds, such as acrylic latex, wetting a finger and running down the caulking bead will leave a smooth surface.
5. When finished, disengage plunger on caulking gun and pull back to stop compound from flowing.

#2

Apply Weatherstripping To A Home

Work with your parent, a neighbor or a landlord to see if they would help you apply weatherstripping to a door or window. Using small groups, apply weatherstripping to a door in your classroom or school. Report back to the class or write a summary of your experiences.

unit of instruction:	subject area:	suggested for:
Windows and Energy	Housing and Home Furnishings	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

After completion of this unit the student should determine that a great amount of heat loss is through the windows of a home. The student should identify which types of windows are more efficient to use.

SPECIFIC OBJECTIVES

After completion of this unit the student should be able to:

1. Relate home heat loss to the amount of window space in the home.
2. Identify types of windows.
3. Determine how heat loss might be minimized in window areas.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES - See Assignments Attached

EVALUATION TECHNIQUES

1. Evaluate results of student assignment sheets.
2. Give written test over types of windows and how heat loss might be minimized.
3. Have students design a bulletin board after the information on windows has been covered.

SUGGESTED MATERIALS AND RESOURCES

Periodical: Energy Horizons, 1999 Shepard Road, St. Paul, Minnesota 55116.

Pamphlets: "Andersen Energy Facts", (free), Andersen Corp., Box 12, Bayport, Minnesota 55003.

"The Fuel Savers: A Kit of Solar Ideas", Scully, Prowler and Anderson, (1978) $3.75 includes handling. Total Environmental Action, Inc., Church Hill, Harrisville, New Hampshire 03450.

"Electricity: Use It For All It's Worth", 35¢, Colorado Power Council, 1275 South Eaton Court, Denver, Colorado 80226.

Books & Films: See Housing and Home Furnishings Resources

DEVELOPED BY

Judith Johnson

background information

I. Structural Qualities of Windows - a home loses about 30% of its heat through windows. Windows have a very low R-Factor but there are some structural features on a window that will reduce heat loss. It is difficult to eliminate windows completely because of their positive functions of letting in natural light, allowing ventilation and opening the home to exterior views.

Glass by itself offers almost no resistance to the passage of heat. It is the air films on both sides of the glass, or between the panes of double glazing, that provide insulation. A single glazing has a total resistance to heat transmittance of only R 0.89. Double glazing, only R 1.8. A resistance of R 18 is common for an insulated wall. In other words, ten or twenty times more heat escapes through each square foot of window than through a wall.

II. Types of Windows

A. Single glazed - one pane of glass between inside and outside of home.

B. Double glazed - two panes of glass with dead air space between.

C. Triple glazed - three panes of window glass. creating two airspaces between the panes.

D. Aluminum framed - glass held in place by aluminum framing which is a great conductor of heat and cold.

E. All wood framed - glass held in place by frames of wood which allow less conductivity.

F. Vinyl - clad wood framed - a frame of wood holds the glass. On the exterior the wood is covered with a vinyl covering in order to eliminate painting the exterior of the window frame.

G. Storm windows - an additional pane of glass added to exterior or interior which allows space between it and original window and reduces air flow in and out.

H. Stationary (or non-operable) - a window that does not open. Usually has a tighter seal which reduces flow of air, than a window that opens.

I. Plastic storm window - an inexpensive plastic sheeting to place over your window that reduces air flow. Usually it is attached in late fall and removed in the spring.

background information

Continued

J. Tempered glass window - specially made glass that does not shatter when broken, therefore, is safer. It is required in some building codes where windows are placed close to an exterior door.

K. Thermopane - special glass designed to have a somewhat greater R-value than regular glass.

III. Ways to Increase R-value of Windows

A. Add weatherstripping to all sides of sash.

B. Recaulk edges of glass every few years.

C. Install storm windows.

D. In new construction, adding a layer of foam between window frame and wall.

E. Filling all cracks and spaces around window frames with caulking compound.

assignment

Level I & II

1. Give students unit objectives.
2. Give students background information.
3. Invite an architect or engineer to speak to the class on calculating heat loss of a home (assignment #1). Note: This assignment is also used in Unit 8 on Home Heating. Heat loss of windows should be done at the same time.
4. Invite factory representative from an insulating window company, (example: Pella Windows, Andersen Windowalls, Posie Windows, Karadco Windows) to speak to class about the structure and quality of windows.
5. Help the students to evaluate the heat loss from windows with different structural qualities.
6. Have the students investigate the amount of window area in your classroom or home (assignment #2).
7. Divide class into groups and have each group find illustrations or examples of each of the window types listed in the background information.
8. Have students caulk or weatherstrip a window (see Unit 10).
9. Design a bulletin board illustrating the structure of various types of windows.

assignment

#1

Calculate Heat Loss of a Home

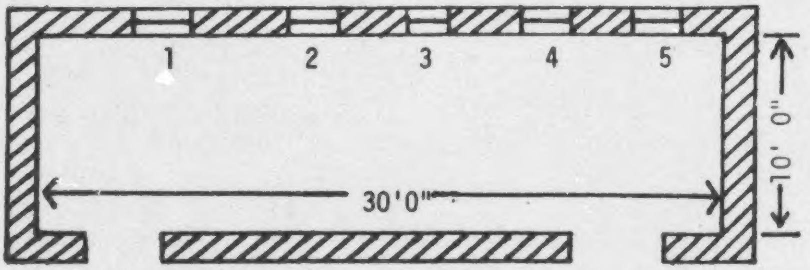
Invite an architect or engineer to help the class to calculate heat loss of a home. Use the learnings to calculate heat loss in your current home. Report the findings below and figure the amount of BTUs required to keep the home at 68°.

#2

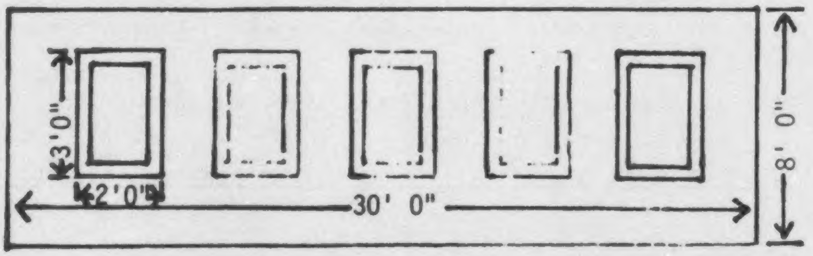
Window Area Investigation

Since glass has much less insulative value than a wall, it is wise to use as little glassed area (windows) as possible to conserve energy for cooling and heating. There are building code restrictions and guidelines for the amount of glassed area: 10 percent of the total square footage of floorspace for the home and less than 20 percent of the total square footage of the exterior wall are generally accepted standards for residences.

It is a simple arithmetic procedure to determine if your home or classroom meets these guidelines. First try the 10-percent-of-the-floor method. In the example below, we see the square footage of the room is 300 square feet.



From the elevation, we see the total glassed area is 30 square feet.



To determine the percentage of glassed area you simply divide:

$$\frac{30}{300} \quad \frac{\text{glassed area}}{\text{floor area}} = .10 \text{ or } 10\%$$

assignment

Continued

Now try the 20-percent-of-total-wall-area method. In the example, the total wall area is 240 sq. ft. since 8' x 30' = 240 sq. ft. The glassed area is 30 sq. ft. Therefore, the percentage of glassed area is:

$$\frac{30}{240} = .125 \text{ or } 12.5\%$$

Using either method, the glassed area is within the guidelines.

Now determine if your classroom or home meets the guidelines.

Method I: 10% of floor area

Total Floor Area ______________ sq. ft.

Total Glassed Area ____________ sq. ft.

$$\underline{\qquad\qquad\qquad\qquad}\frac{\text{glassed area}}{\text{floor area}} = \underline{\qquad\qquad} = \underline{\qquad\qquad}\%$$

Method II: 20% of wall area

Total Wall Area _______________ sq. ft.

Total Glassed Area ____________ sq. ft.

$$\underline{\qquad\qquad\qquad\qquad}\frac{\text{glassed area}}{\text{wall area}} = \underline{\qquad\qquad} = \underline{\qquad\qquad}\%$$

Suggestions:

1. Try both methods in the classroom before trying to tackle your home.
2. This makes a good group activity.
3. This activity may be used in conjunction with reading floorplans and measuring interior spaces.
4. Remember to measure only the glassed area of windows - not the frames, too.
5. Note that weather changes will also affect heating and cooling energy uses.

assignment

What Is It? How Does It Save Energy?

Time: 50 minutes

Students should rotate around the room to approximately 15 different stations. At each station, after viewing a numbered device, they are to fill in their chart (see attached sheet) with what it is and how does it save energy. (A way to introduce energy conservation in the home).

Suggestions for Stations:

- dimmer switch
- caulking gun
- water restrictor for shower head
- furnace filter
- small piece of mylar
- plastic bottle with cap for toilet
- several different types of weatherstripping
- glass fireplace doors
- sponge or foam insert for electrical outlet
- piece of insulation
- small piece of plastic for window

HF 11-8

WHAT IS IT?	HOW CAN IT SAVE ENERGY?

Housing and Home Furnishing Resources

Periodical:

Energy Horizons, 1999 Shepard Road, St. Paul, Minnesota 55116

Pamphlets:

"Sixty Five Ways to Save Natural Gas", U.S. Department of Energy

"Energy Savings Through Automatic Thermostat Controls", U.S. Department of Energy

"Put The Sun To Work Today", U.S. Department of Energy

"44 Ways to Build Energy Conservation Into Your Homes", B.Q. Meeks Owens-Corning Fiberglas Corp., Fiberglas Tower, Toledo, Ohio 43659.

"The Arkansas Store", B.Q. Meeks, Owens-Corning Fiberglas Corp., Fiberglas Tower, Toledo, Ohio 43659.

"Making the Most Of Your Energy Dollars In Home Heating and Cooling"; the government sends this 16 page booklet to consumers. B.Q. Meeks, Owens-Corning Fiberglas Corp., Fiberglas Tower, Toledo, Ohio 43659.

"In the Bank or Up The Chimney", (1976); Chilton Publications, U.S. Department of Housing and Urban Renewal.

"Electricity: Use It For All It's Worth", (35¢) Colorado Power Council, 1275 South Eaton Court, Denver, Colorado 80226.

"How To Save Money by Insulating Your Home", Federal Energy Administration, Office of Energy Conservation.

"Insulations for Thermal and Sound Control", B.Q. Meeks, Owens-Corning Fiberglas Corp., Fiberglas Tower, Toledo, Ohio 43659.

From Public Service Company of Colorado, 550 15th Street, Denver, Colorado 80202 - "Your Energy Budget Manager", and "Feather Your Nest - Use Energy Wisely", "Home Energy Audit Kit".

"How To Insulate Homes for Electric Heating and Air Conditioning", National Mineral Wool Insulation Association, Inc., 382 Springfield Avenue, Summit, New Jersey 07901.

Meyers, Donald, "How To Insulate Your Home and Save Fuel", (1977), $2.00, U.S. Department of Housing and Urban Renewal.

"The Fuel Savers: A Kit of Solar Ideas", Scully, Prowler and Anderson, (1978), $3.75, includes handling. Total Environmental Action, Inc., Church Hill, Harrisville, New Hampshire 03450.

"Andersen Energy Facts", (free), Andersen Corp., Box 12, Bayport, Minnesota 55003.

Reference Books:

Jones, Raymond, Insulation Heat: Framing Sheathing and Insulation, (1973) VanNostrand Publications.

Anderson, Bruce with Michael Riardan, The Solar Home Book: Heating, Cooling and Designing with the Sun, Harrisville, New Hampshire; Cheshire Books, 1976, 304 pp. (complete, up-to-date, amply illustrated, treats the entire subject well).

Housing and Home Furnishings Resources - Continued

Clegg, Peter, New Low-Cost Sources of Energy for the Home, Charlotte, Vermont, Garden Way Publishing, 1975, 252 pp. (treats not only solar, but wind, wood, water and waste. Includes catalog references.)

Eccli, Eugene, editor, Low-Cost, Energy Efficient Shelter for the Owner and Builder, Emmuas, Pennsylvania, Rodale Press, Inc., 1976, 408 pp. (excellent treatment of a broad range of energy conserving ideas for the home).

Roberts, Rex, Your Engineered House, New York, M. Evans & Co., 1964, 237 pp. $8.95 from J.P. Lippincott Co., E. Washington., Philadelphia, Pennsylvania 19105. (Written in clear non-technical language. Common sense approach to house design.)

The Solar Home Book, Bruce Anderson and Michael Riardan (Cheshire Books), 1977. The fundamentals, history and technology of the solar home in non-technical language. Over 160 illustrations. Includes climatic and design data plus sources for information and supplies. ("Best book yet on solar" - New York Times), 304 pages, soft cover $8.50.

Films, Slides and Filmstrips:

Slides: "Our Energy Problems", H6349R-6, $19.00 per set.

"Alternate Energy Sources", H6362-6, $19.00 per set.

J. Weston Walch
Portland, Maine 04104

Film: "Energy, New Sources", Churchill, 1973, 20 minutes color.

Filmstrips: "Energy - Use It Wisely Around the Home", #199, 69 frames and cassettes, Photo Lab, Inc., 3825 Georgia Avenue, Washington, D.C. 20011, $30.00

"Energy For Man", National Geographic Society, 17th and M. St., N.W., Washington, D.C. 20036.

"Energy For The Future", National Geographic Society, 17th and M. Street, N.W., Washington, D.C. 20036.

"Energy For Man", 4 filmstrips and cassettes, BFA Educational Media, 2211 Michigan Avenue, P.O.Box 1795, Santa Monica, California 90406.

Books:

Energy Activities for the Classroom, ERIC Center for Science, Mathematics and Environmental Education, College of Education, The Ohio State University, 1976. pp. 23-24.

Energy Conservation in the Home, an Energy Education/Conservation Curriculum Guide for Home Economics Teachers, U.S. Department of Energy, prepared by The University of Tennessee Environment Center and College of Home Economics, Knoxville, Tennessee, October, 1977.

Note: Teacher should collect current articles from periodicals and magazines that give information on ways to conserve energy.

INDEX

Section - Child Development

Unit I. - Feeding of Infants
Unit II. - Care of Infant (Diapering)
Unit III. - Safety
Unit IV. - Children's Art
Unit V. - Toys and Play Equipment
Unit VI. - Language Activities
Unit VII. - Science
Unit VIII.- Child Development Resources

unit of instruction:
Feeding of Infants

subject area:
Child Development

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

The student should be able to explain the routine feeding of an infant in relation to energy conservation.

SPECIFIC OBJECTIVES

After completion of this unit the student should be able to:

1. List energy as a factor to consider when choosing a method of feeding a baby.
2. Compare amounts of energy used in different food preparation methods.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES FOR LEVEL I

In small groups, have the students list the energy that is used in the preparation of a jar of baby food. List each energy source on the blackboard. Compare with energy required for preparing baby food at home.

SUGGESTED ACTIVITIES FOR LEVEL II

Assignment Sheet #1: Energy comparison of purchased baby food vs. home prepared food. Time: 50 minutes

In small groups, have students discuss and complete attached chart for one vegetable or fruit and answer thought questions.

Assignment Sheet #2: Breast feeding - Bottle feeding. Is there an energy difference? Time: 1 hour 45 minutes

Have the students compare the energy expended in bottle feeding vs. the energy expended in breast feeding.

Optional Assignment: Compare the energy used to produce disposable bottles vs. reusable bottles. (Refer to FN 2-5 through FN 2-10).

EVALUATION TECHNIQUES

After completion of assignment, students should be able to answer the thought questions considering different amounts of energy used for like products.

SUGGESTED MATERIALS AND RESOURCES

Contact your local utility company for publication dealing with cost of appliance usage.

DEVELOPED BY

Brenda Qualteri

assignment

Energy Used in Preparation of Baby Food

1. Pick one vegetable or fruit that you might use for a 6 month old child.
2. Rank the amount of energy needed for the preparation of each.
   Use a 0 if no energy other than human energy is needed.
   Use a 1 if small amount of energy is needed.
   Use a 2 if moderate amount of energy is needed.
   Use a 3 if large amount of energy is needed.

   If two items use the same amount of energy, then assign them the same number.

Name of Vegetable or Fruit ______________________________

Type of Energy Used	Jar of Baby Food	Fresh food prepared with a blender	Fresh food prepared with hand food grinder
1. Gasoline to purchase food			
2. Energy to cook food			
3. Energy to grind food			
4. Energy to package food			
5. Energy to store food			
6. Energy to warm food			
Total amount of energy units used			

Thought Questions:

1. What conclusions can you draw from this?
2. Which method seems to conserve more energy?
3. Which method do you think is best for the baby?
4. Do you see this as a practical way to conserve energy?

assignment

Breast Feeding - Bottle Feeding
Is There an Energy Difference?

Using information given you about bottle and formula preparation, compare the energy expended in bottle feeding vs. the energy expended in breast feeding.

	BOTTLE FEEDING	BREAST FEEDING
How Many Feedings per Day in the First Week of Life?		
Energy Expended in Bottle and Formula Sterilization	Method I 1. Amount of time to bring _____ bottles and water to a boil is _____ minutes. 2. Cost for large surface unit for 1 minute_____________. 3. ________ x _____________ = total minutes x cost/minute ________ = cost per day. Method II or III 1. Boil nipples and equipment ____ minutes. 2. Amount of time to boil ____ ounces of water in a tea kettle = ______ minutes. 3. Cost for large surface unit per 5 minutes___________. 4. __________ x ___________ = Total Minutes x cost/minute = _________ cost per day.	
Energy Expended in Warming Formula	_____¢ for 10 minutes _____ number of times warmed _____¢ per day	
Other Ways Energy Would Be Consumed		

assignment

Add the total amounts of:

1. Energy expended to sterilize bottles per day ____________
2. Energy expended to warm bottles per day ____________

Total energy cost per day ____________

Assuming 10,000 babies are born each day in the United States, what would the energy savings be if all mothers breast-fed their children?

Thought Questions:

1. What conclusions can you draw from this comparison?
2. Which method conserves more energy?
3. Which method do you think is best for the baby?
4. Do you see this as a practical way to conserve energy?
5. Are there ways you could vary these methods and cut down on the energy used?
6. What other things would you need to consider before making a decision?

background information

A. See attached sheet on bottle preparation.

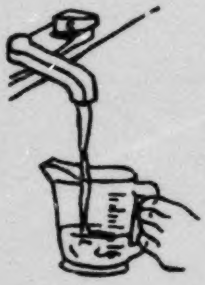
B. Energy required for formula related equipment *

1. Baby food warmer - 1/10 of a cent for 10 minutes. ($.001)
2. Large surface unit on electric range - 8/10 of a cent for 5 minutes. ($.008). 16/100 of a cent for 1 minute ($.0016).
3. Blender 2/100 of a cent for each minute ($.0002).

C. Note to Teacher: This unit would probably be best taught after covering such things as infant nutrition, infant stimulation, disadvantages and advantages of breast and bottle feeding.

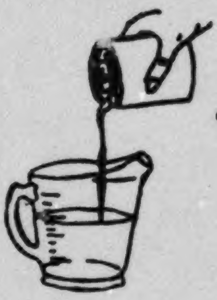
* Costs based on an average cost of 4.01¢ per kilowatt hour.

METHODS FOR BOTTLE PREPARATION FOR AN INFANT



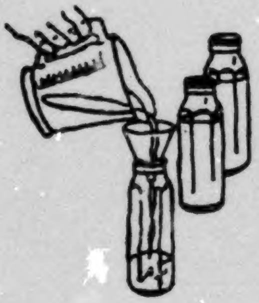
Method I:

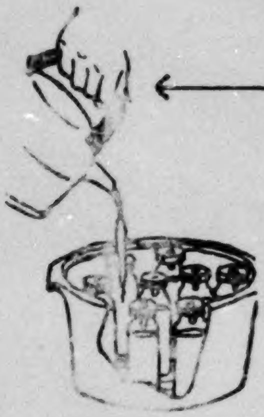
1. First measure the correct amount of water into the pitcher.



2. Then pour the right amount of formula into the measuring pitcher containing the water. Stir to mix.

3. Then pour the right amount of this formula mixture for a single feeding into each nursing bottle. Place nipples on bottles. Protect each nipple with a loosely fitting cover.





4. Put bottles on rack in sterilizer (or in deep kettle with a rack and tight fitting lid). Pour about 2 inches of water in bottom of sterilizer.

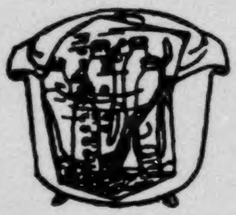
5. Bring water in the sterilizer to a boil, put on lid and keep the water boiling gently for 25 minutes.

6. Keep the lid on the sterilizer, remove it from the stove. Let it stand until it is cool enough to be moved by hand, and then refrigerate.

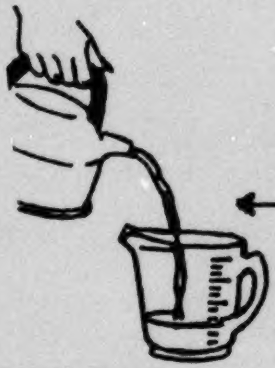
7. Remove lid, lift out bottles, but keep nipples covered. Immediately put the bottles of formula in the refrigerator. Remove only when needed for feeding.

Method II:

1. Place all utensils, bottles, nipples, and covers on rack in deep kettle. Pour enough clean water into kettle to completely cover utensils. Bring water to a boil, cover and boil for 5 minutes.

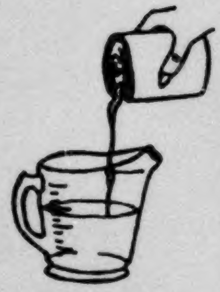


2. While utensils are being sterilized, boil an additional supply of clean water for 5 minutes in the tea kettle or saucepan.



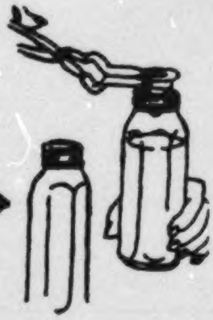
3. Measure the correct amount of freshly boiled water from the tea kettle (or saucepan) into the sterilized pitcher.

4. Then pour the right amount of formula into the measuring pitcher containing the water. Stir thoroughly with the sterilized mixing spoon.



METHODS FOR BOTTLE PREPARATION FOR AN INFANT CONTINUED

5. Using the sterilized funnel, pour the right amount of this formula mixture for a single feeding into each sterilized nursing bottle.

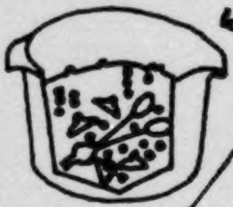


6. Place sterilized nipples on bottles. Be careful not to touch tips of nipples. Protect each nipple with a loosely fitting cover.

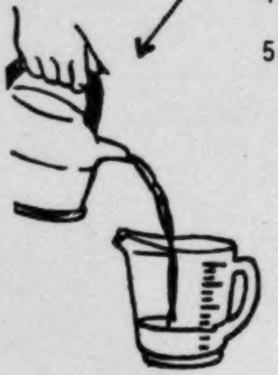
7. After bottles have cooled, store them in the refrigerator. Remove only when needed for feeding.

Method III:

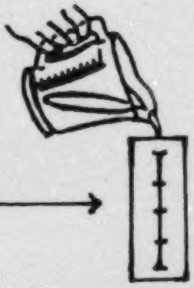
1. In kettle, boil nipples and utensils covered with water for 5 minutes.



2. Measure the correct amount of freshly boiled water and mix with formula.

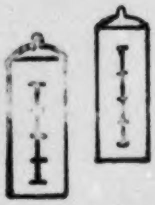


3. Pour formula mixture into pre-sterilized bags of disposable nursers.



4. Attach nipples and caps.

5. Refrigerate.



unit of instruction:
Care of Infant
(Diapering)

subject area:
Child Development

suggested for:
Level II (Senior High)

UNIT OBJECTIVE

The student will be able to explain the routine physical care of an infant and the energy costs involved.

SPECIFIC OBJECTIVES

Upon completion of this unit, the student should be able to:

1. Identify costs involved in using cloth diapers laundered by parent, a diaper service and disposable diapers.
2. Identify types of energy consumed in the use of each type of diaper use.
3. Compare cost and energy use between the three types of diaper use.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES Level II - (in-depth course)

Time: 50 minutes

Have the students identify and compare costs and energy usage of three selections for diaper use using the information they have received. A chart like the one below may be helpful.

Type of Diaper	Itemized Cost	Itemized Energy Use	Evaluation
A. Cloth diaper laundered by parent			
B. Diaper Service			
C. Disposable			

EVALUATION TECHNIQUES

Have the students discuss findings with members of the class. Each student should write a short paragraph explaining which type of diaper and its care they would use and why including a statement about energy use and conservation.

SUGGESTED MATERIALS AND RESOURCES

Contact your local utility and/or state energy office for pamphlets on the wise use of appliances, energy saving tips for homeowners, etc. Also contact a local diaper service for information.

Diapering Cost - Comparison Project - Leaflets Free of Charge from Procter and Gamble, P.O.Box 599, Cincinnati, Ohio 45201

DEVELOPED BY
Beth Hays

background information

Selection of Diapers

A. Three choices for kind of diapers used for an infant:

  1. Purchase cloth diapers and launder by parent
  2. Use cloth diapers and a diaper service
  3. Use disposable diapers

B. Quantity of diapers needed daily

C. Costs involved

  1. Cloth diapers laundered by parent

    a. Initial purchase of diapers (additional purchases may have to be made before toilet training occurs)
    b. Laundry products
    c. Water use
    d. Washer/dryer costs
    e. Individual's time

  2. Diaper service

    a. Cost of service
    b. Back-up supply, if needed

  3. Disposable diapers

    a. Cost of diapers
    b. Cost of transportation to store to purchase

D. Energy Usage

  1. Cloth laundered by parent

    a. Washer/dryer - energy to operate
    b. Hot water heater
    c. Personal energy
    d. Purchase of laundry products

  2. Diaper service

    a. Energy used in delivery and pick-up
    b. Cleaning process

  3. Disposable

    a. Production of diapers
    b. Repeated purchases
    c. Disposal of soiled diapers

unit of instruction:	**subject area:**	**suggested for:**
Safety	Child Development	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

Student will examine ways to protect and insure the safety of infants and young children.

SPECIFIC OBJECTIVES

Upon completion of this unit, the student should be able to:

1. Identify safety hazards as they pertain to energy related items in the home.
2. Develop a plan for a safe environment for infants and young children as it pertains to energy related items.

BACKGROUND INFORMATION

Refer to the safety unit in the Colorado Child Development Curriculum Guide for information.

SUGGESTED ACTIVITIES FOR LEVEL I (Applicable for Jr. High or Sr. High Level I students)

Have the students complete Assignment Sheet #1 - Time: 50-55 minutes for infants and toddlers.

SUGGESTED ACTIVITIES FOR LEVEL II

Have the students complete Assignment Sheet #1 - Time: 2-3 hours for preschoolers or elementary school children.

After completion of the safety check list, compare results with class members and develop a brief program that could be presented to parents of young children to make them more aware of the safety aspect of energy use in the home.

DEVELOPED BY

Beth Hays

assignment

Safety Check List

Develop a check list to evaluate your own home to check for safety of young children. List the energy using items in your home. Describe existing conditions of the items listed and any suggested improvements.

Item	Existing Condition	Suggested Improvements

Thought Questions:

1. Which area(s) seemed to show up most often?
2. Is there a particular age child for which this would be a greater safety hazard?
3. What are general rules of safety you would give parents of young children concerning energy related items?

unit of instruction: Children's Art

subject area: Child Development

suggested for: Level II (Senior High)

UNIT OBJECTIVE

The student will demonstrate ability to plan and initiate activities for young children.

SPECIFIC OBJECTIVES

At the completion of this unit, the student will be able to:

1. Plan and initiate art activities for children that help them to be aware of ways energy is used our daily activities.
2. Plan and initiate art activities for children that help them to be aware of ways to conserve energy.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES

Have the students complete steps A and B of the attached assignment sheet. Time: (Step A) 50-55 minutes
(Step B) 20-25 minutes

EVALUATION TECHNIQUES

Individual or group discussion assessing the effectiveness of the activity, suggested improvements, etc.

DEVELOPED BY

Beth Hays

background information

Art Information Sheet

I. Terms and definitions

- A. Art - A means of self-expression in visual form
- B. Creativity - Ability to produce or design by use of originality and self-expression
- C. Media - Means of conveying or expressing something

II. Function of the teacher in creative art activities

- A. Create an environment that fosters optimum growth, challenges, and stimulates
- B. Provide individual attention
- C. Provide adequate space, time and materials
- D. Stimulate creative expression
- E. Act as an interpreter of the child's work
- F. Provide consideration of child's developmental level

III. Obstacles which prevent creative thinking

- A. Peer and adult pressures for conformity
- B. Pressures against questioning and exploration
- C. Emphasis on sex-role differences
- D. Success-oriented culture which makes errors fatal and makes children afraid to chance trying a new approach
- E. Emphasis on work rather than play

IV. Characteristics of children's art

- A. Children delight in expression and in representing the way things look to them
- B. A child creates what is important to him/her.
- C. A child uses colors which please him/her. (Note: These colors may bear little relation to the actual colors of the objects created.)
- D. Children enjoy using imagination with freedom (Note: Copying changes the whole experience for them. Children who have had coloring books tend to lose the capacity to perceive in individual ways and with naturalness.)
- E. Techniques or skill in art activities are not important for young children (Note: The process is far more important than the product. Of importance is the expression of feelings, seeing things and the satisfaction and release which this expression brings.)

V. Value of art activities

- A. Means of self-expression in visual form
- B. Provide opportunities to explore and experiment

Art Information Sheet Continued

C. Express ideas and feelings about her/himself and the world around him/her.
D. Strengthen ability to imagine and to observe
E. Increase his/her sensitiveness to her/himself and to others.
F. Has therapeutic value

   1. Can express feelings that are otherwise unacceptable and can learn to handle such feelings in an acceptable manner
   2. Can express strong feelings

G. Helps children grow socially

   1. Learn to share
   2. Learn to make decisions
   3. Learn to respect rights, property, opinions, and feelings of others
   4. Learn to develop leadership qualities
   5. Become aware of importance of cooperation and self-control

H. Provides opportunity for intellectual growth
I. Provides opportunity for physical growth, exercise, and motor coordination
J. Provides opportunity for the development of a real talent or a simple appreciation of art
K. Provides opportunity for the development of responsibility in caring for art supplies and equipment

VI. Guidelines for enhancing creative art activities

   A. Allow children to use all art media as a means of self-expression
   B. Enforce limits as to where children may use art materials. (Note: Do not expect the child to be neat at all times.)
   C. Give approval of the child's attempts.
   D. Raise questions to stimulate thought.
   E. Display all of the children's work. (Note: This display, whether in the home or classroom, lets him know that his work is enjoyed.)
   F. Be sure art materials are sturdy.
   G. Give children uninterrupted time.
   H. Give art materials readily available for the child to use.
   I. Give the child help when needed.
   J. Provide art as a part of the child's familiar, everyday world.

VII. Sequential stages of self-expression in children's art

   A. Scribbling

      1. Usually begins when the child is first introduced to pencil, crayon, clay, or other media

Art Information Sheet Continued

2. Usually extends to about the fourth year
3. First efforts are exploratory and largely muscular activity
   Example: Swings the arm and watches the resulting marks
4. Interested in the tool or material and what it can do
5. Soon learns that she/he can control them by lifting the marker up or repeatedly drawing lines consciously up and down and across the paper
6. Tasting is as important as feeling

B. Presymbolic

1. Child consciously creates forms
2. Continuously tries out new concepts in an effort to establish his/her own individual pattern or symbol
3. Characterized by h/er constantly changing symbols
4. Begins as the child strives for a relationship with reality in h/er drawings
5. Child produces a large variety of symbols for the same object

C. Symbolic

1. Develops awareness through individual experiences
2. Begins to see her/himself as part of the environment
3. Begins with ideas and tries to draw them
4. Concerned with styles of design and organization

VIII. Creative art activities for children

A. Painting
B. Stringing beads
C. Coloring
D. Water painting (Note: This is the use of water to make designs.)
E. Modeling
F. Pasting
G. Cutting and tearing
H. Fingerpainting
I. Using blocks
J. Flannelboard
K. Making collages (Note: This is the putting of printed materials or other materials on a picture surface.)
L. Putting together jigsaw puzzles
M. Papier-mache
N. Printing with paints (Note: This is the use of tempera paint and objects carved into different shapes.)
O. Modeling with pipe cleaners (Note: There are many other types of creative art activities for children which could be added to this list.)

assignment

Step A With the help of your classmates and instructor, develop a symbol to be used with children to remind them to conserve energy. Some suggestions might include a clown's face, an animal or a smiling face. Get lots of suggestions and select the best one.

Step B Once you have the symbol, let pre-school age children help you make some and let them determine where they should be placed to remember saving energy - examples: refrigerator/freezer doors, outer doors in winter, light switches, etc.

Make a sample plan sheet, including: a sample of the symbol, materials needed for making the symbol, what the teacher aide will do, and what the children will do.

Plan for conversation with children on energy.

What do you want the children to learn?

Discuss the activity with your teacher following completion. Be sure to consider what could be improved if you were to do it again.

unit of instruction:	subject area:	suggested for:
Toys and Play Equipment	Child Development	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

The student should be able to evaluate the purposes, characteristics and safety of toys and play equipment for children.

SPECIFIC OBJECTIVES

Upon completion of this unit, the student should be able to evaluate young chilren's toys, comparing those toys which require outside energy sources to those that require only human energy.

BACKGROUND INFORMATION

Refer to Child Development Curriculum dealing with play and the use of toys.

SUGGESTED ACTIVITIES FOR LEVELS I & II

Have the students complete the assignment sheet and chart. Time: 1½ hours

EVALUATION TECHNIQUES

After completion of assignment, the student should be able to write a short paragraph discussing the need or lack of need for outside sources of energy in children's toys.

SUGGESTED MATERIALS AND RESOURCES

Posterboard, magazines, catalogues, scissors and glue

Naturally Powered Old Time Toys: How to Make Sun Yachts, Sail Cars, a Monkey on a String and Other Moving Toys. Marjorie Henderson and Elizabeth Wilkinson, Lippincott, 1978.

"Power to Tell Time", James L. Harrison and Albert A. Bartlett, The Physics Teacher, pp. 304-6, May, 1978.

DEVELOPED BY

Brenda Qualteri

assignment

Children's Activities: Toys

Comparison of toys that use non human energy vs. human energy.

1. In small groups using magazines and catalogues, each person should select pictures of two toys that use some type of energy and two toys that need only child's energy.
2. Mount the pictures on poster board dividing the toys into groups -- those that do use energy and those that do not.
3. Select two toys that are for a similar age -- one that needs energy and one that does not. Each group should discuss the toys and complete the attached chart. Rank with a 5 if there is a great deal of muscle involvement, creativity, safety, stimulation and cost involved. If no muscles are involved, no creativity, etc., then give the toy a rank of 0. You may use the numbers 4, 3, 2 and 1 for amounts in between.
4. Discuss the toys and make a composite chart for your group.
5. Answer the following thought questions:
    a. What conclusions can you draw from this activity?
    b. Which toy is the best for the child's development? Why?
    c. Is this a practical way to conserve energy?

	TOYS THAT USE NO ENERGY					TOYS THAT REQUIRE ENERGY FOR USE				
	Muscles	Creativity or Imagination Required	Safety	Purchase Price	Other Stimulation Provided	Muscles	Creativity or Imagination Required	Safety	Purchase Price	Other Stimulation Provided
Set 1										
Set 2										

unit of instruction:
Language Activities

subject area:
Child Development

suggested for:
Level II (Senior High)

UNIT OBJECTIVE

The student will demonstrate the ability to plan and initiate language activities with young children.

SPECIFIC OBJECTIVES

Upon completion of this unit the student will be able to:

1. Plan and initiate language activities for children that help them to be aware of ways energy is used in our daily activities.
2. Plan and initiate language activities for young children that help them to be aware of ways to conserve energy.

BACKGROUND INFORMATION

Refer to the Colorado Child Development Curriculum Guide for a review of language development and language activities for young children.

SUGGESTED ACTIVITIES

Have the students complete both steps of Assignment Sheet #1. Time: (Step A) 2 hours, (Step B) 2 hours. Assignment Sheet #2 - Time: 30 minutes.

EVALUATION TECHNIQUES

Have the students prepare a written self-evaluation including:

a. Their planning
b. Children's reactions
c. Suggestions for improvement

SUGGESTED MATERIALS AND RESOURCES

Dear Garbage Man, Eugene Zion, Scholastic Books, Harper-Row 1957

Energy Activities with Energy Ant, Consumer Information Center, Pueblo, Colorado 81009, Catalogue #640F

Local children's librarian for additional suggestions for suitable picture books if Dear Garbage Man is not available.

DEVELOPED BY

Beth Hays

assignment

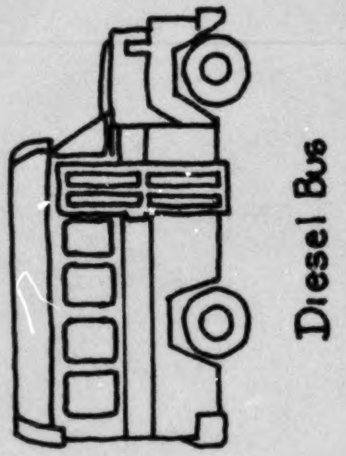
To enable children to be aware that a lot of things we do each day use energy and that by proper usage of current sources or using alternative methods we can conserve energy. Prepare the following visual aids and use in conversation activities with a group of children:

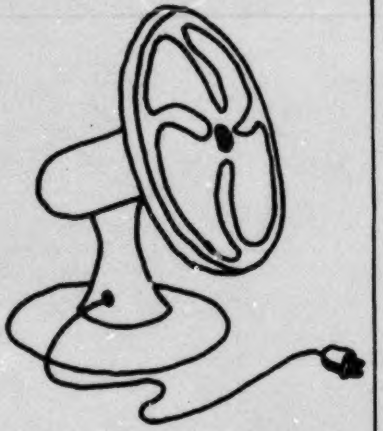
Step A Prepare one display board with pictures of items that use energy other than physical energy. Suggested categories might be transportation, heating, cooling, personal care (such as electric tooth brushes) and food preparation. (See attached pictures for ideas.) Discuss each picture with the children and get their ideas about each.

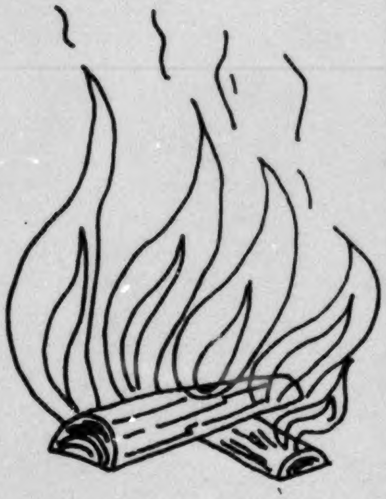
Step B Prepare another set of pictures showing possible alternatives to those mentioned in Step A. Have children help you match to the original set to see if they are aware of choices. Be sure to stress that proper usage of an appliance is a good alternative. Children may have suggestions of their own as to saving methods.

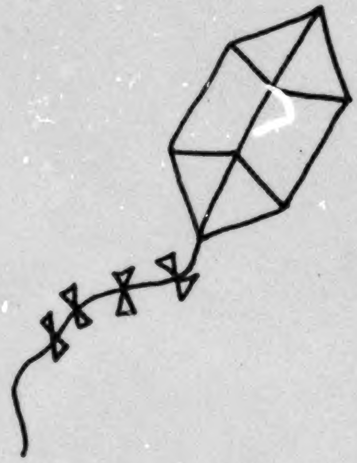
Energy User Cards

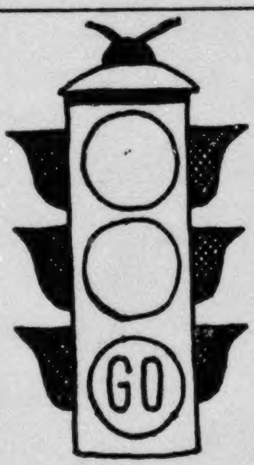
CD 6-3

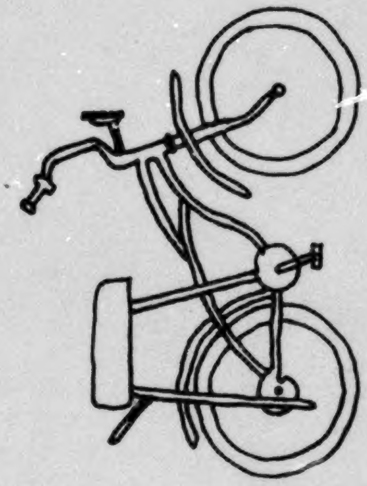


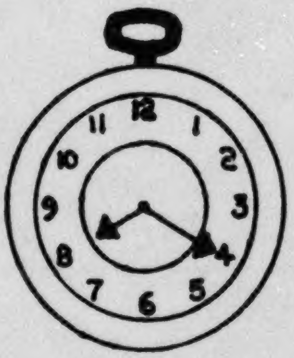


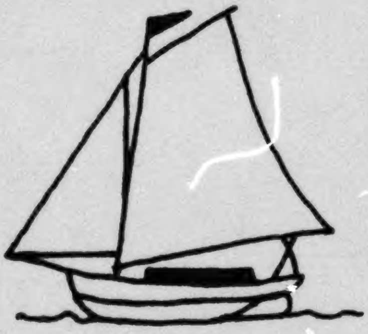


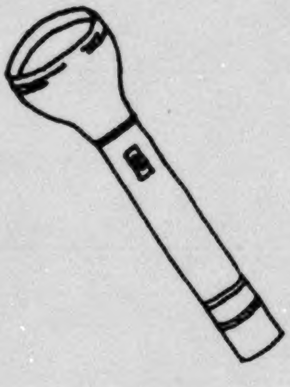










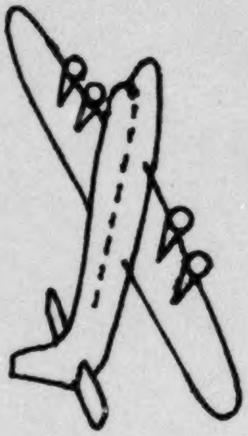


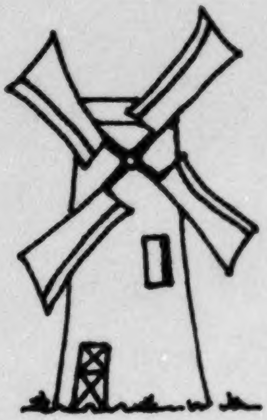
From:
Energy & Man's Environment, Energy and Conservation Education, Activities for the Classroom, Grades 1-3, (Developed by LaVon Aucher of Kirkland, Washington,) 0224 S.W. Hamilton. Suite 301. Portland. Oregon 97201.

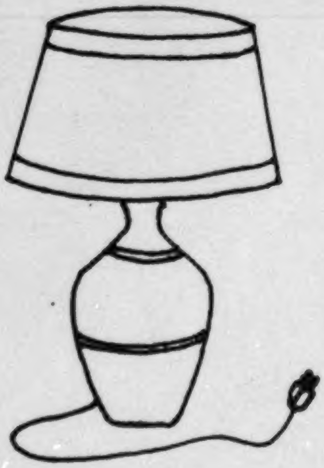
Student Material

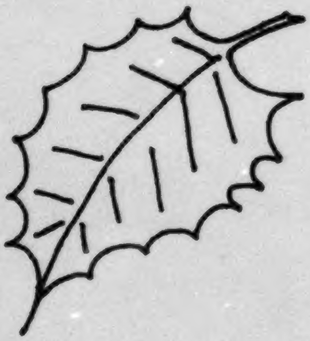
Energy User Cards

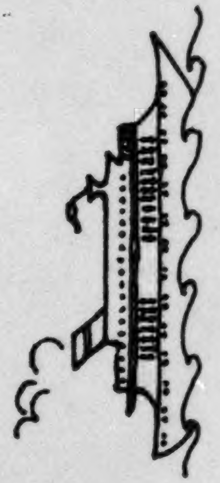
CD 6-4

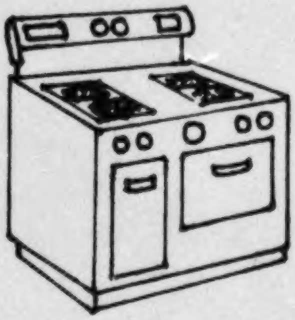




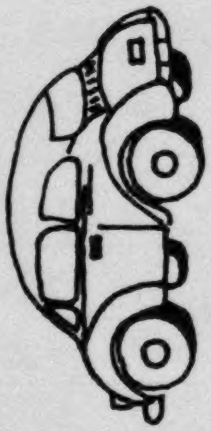


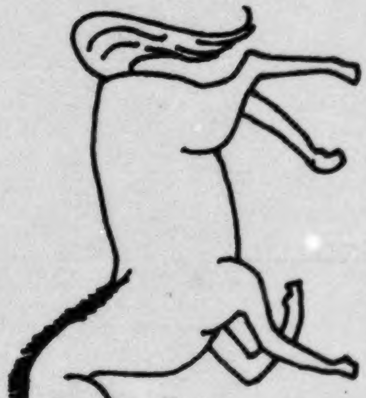


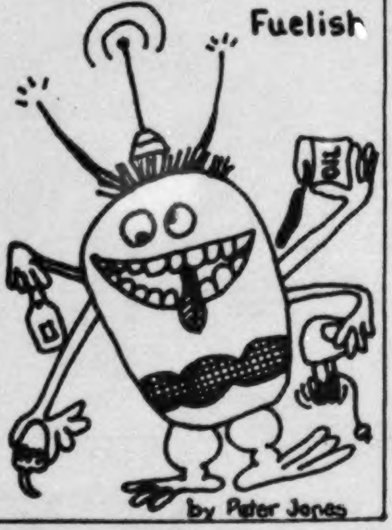




GAS STOVE






Fuelish
OIL
by Peter Jones

From *Energy and Man's Environment, Energy and Conservation Education Activities for the Classroom*, Grades 1-3; 0224 S.W. Hamilton, Suite 301, Portland, Oregon 97201.

assignment

Read Dear Garbage Man, a book about a garbage man who goes on a saving spree. He gives things which people throw away to other people who might use them.

a. This book serves as a natural base for the discussion of reuse of materials.

   1. Discuss things that might be reused which are usually thrown away.
      . . . at home
      . . . at school

   2. Discuss how we can save energy by reusing paper and plastic.

   3. The instructor may want to have some examples of items to help the discussion.

b. Students will be encouraged to bring items to school for reuse, such as plastic bottles, magazines, margarine containers, old wrapping paper.

unit of instruction:
Science

subject area:
Child Development

suggested for:
Level II (Senior High)

UNIT OBJECTIVE

The student will demonstrate ability to plan and initiate science experiences for children. (This objective is applicable for Level II Child Development, the study of the child from 3-6 years of age.)

SPECIFIC OBJECTIVES

After completion of this unit the student should be able to:

1. List the different types of sources of energy.
2. Demonstrate, using visuals or learning experiences, to preschool and kindergarten children, the different sources of energy.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES

Discuss the attached assignments and other student materials with the class. The students will complete assignments 1-5.

Assignment #1: Select one type of energy and through a project or activity explain it to a group of children. Time: 3 hours

Assignment #2: Develop a bulletin board or visual aid to illustrate one type of energy. Time: 2 hours

Assignment #3: Develop and perform for a group of children "Where the Light Bulb Gets Its Juice". Time: 3 hours

Assignment #4: Develop a learning center for a preschool class on energy sources, talk to the children about it and observe the children when they are working with it. Time: 2 hours

Assignment #5: Play the "Energy Trip Ticket Game". Time: 1 hour

EVALUATION TECHNIQUES

After discussion of energy sources in class, the student should be able to explain one or more energy sources to a preschool child using visuals or learning experiences.

SUGGESTED MATERIALS AND RESOURCES

1. Energy Activities with Energy Ant, Consumer Information Center, Pueblo Colorado 81009, Catalogue #640F.

2. The Adventures of Mini-Volts and Wastey Watts, an energy conservation program for preschool youngsters, Energy and Man's Environment, 0224 S. W. Hamilton #301, Portland Oregon 97201.

DEVELOPED BY

Beth Hays
Brenda Qualteri

background information

I. Terms and Definitions

  A. Sources of Energy

    1. Fossil Fuel - Energy gained from the earth's reserves

      a. Coal
      b. Natural Gas
      c. Oil

    2. Solar Energy - Energy gained from heat and light of the sun
    3. Electric Energy - Energy gained from a conversion of mechanical or light energy
    4. Geothermal Energy - Energy gained from heat of the earth's core Energy is produced when water deep in the earth seeps down over very hot rocks
    5. Hydroelectric Energy - Electrical energy from water power
    6. Nuclear Energy - Energy gained from breaking down atoms or combining atoms
    7. Wind power - The harnessing of wind to make power

  B. Biology - Study of living things and their activities
  C. Chemistry - Study of matter and energy
  D. Ecology - Study of organisms in relation to their environment
  E. Physics - Study of earth and universe
  F. Science - Knowledge gained and verified by exact observation and experimentation

II. Methods of Discovery

  A. Observation (Consider appearance, identification, purpose and reason for being.)
  B. Exploration (When exploring, pat it, feel it, play with it, taste it, smell it, and listen to it.)
  C. Investigation (Investigation includes observations, actual experiments and actual experiences.)

III. Steps in performing science experiments

  A. Plan an area for science activities
  B. Begin with something simple and interesting

background information

C. Let child do the discovering
D. Let him/her approach it in his/her own way and do what he/she likes with it
E. Ask questions which will direct his/her attention to something he/she may have overlooked
F. Make comments and explanations simple; use few words
G. Listen to his/her comments
H. Let children discuss among themselves
I. Provide experiences which let him/her use as many of his/her senses as possible

IV. Physical surroundings which help in teaching science to children

A. Room

1. Work table with hard, waterproof surface large enough to enable all children to see
2. Bulletin board at child's eye level
3. Available water
4. Windows for light
5. Bright, lightly colored walls
6. Science table to display items brought by children
7. Cage or place for animals

B. Materials and equipment

1. Serve the purpose for which intended
2. Stimulate an inquiring attitude
3. Be easy to manipulate
4. Be safe for the child to use
5. Be of size in proportion to child's large muscle development
6. Be durable and accurate
7. Provide a variety of experiences

assignment

Explaining Fossil Fuels

I. Coal is Energy

A. Equipment and supplies needed

1. Charcoal or coal
2. Hibachi

B. Procedure

1. Ignite charcoal (Note: Only under adult supervision!)
2. Have students observe heat
3. Roast marshmallows

II. Making fossils

A. Equipment and supplies needed

1. Clay
2. Leaves
3. Bones
4. Teeth

B. Procedure

1. Have children mash or roll clay flat
2. Let children make an imprint with a leaf, bone, etc.
3. Show students a real fossil

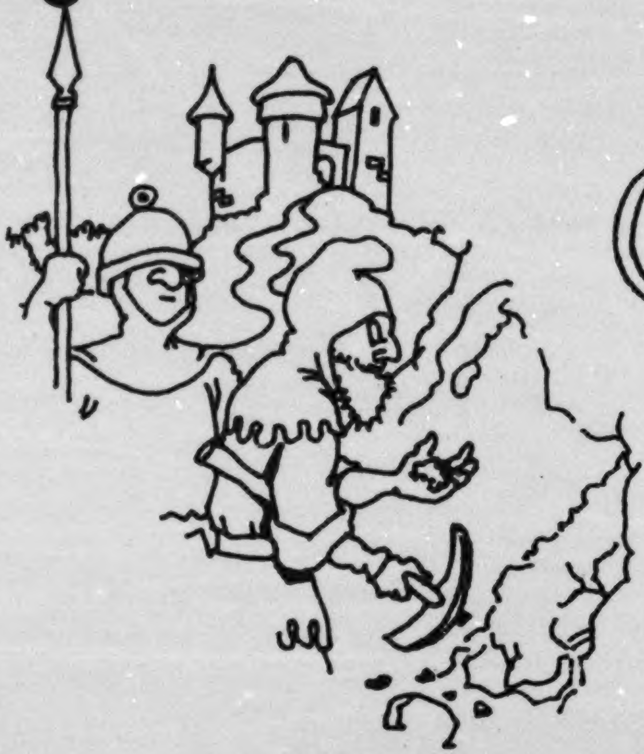
III. Coloring Book

A. Equipment and supplies needed

1. Energy Ant Coloring Book
2. Dittos on fossil fuels

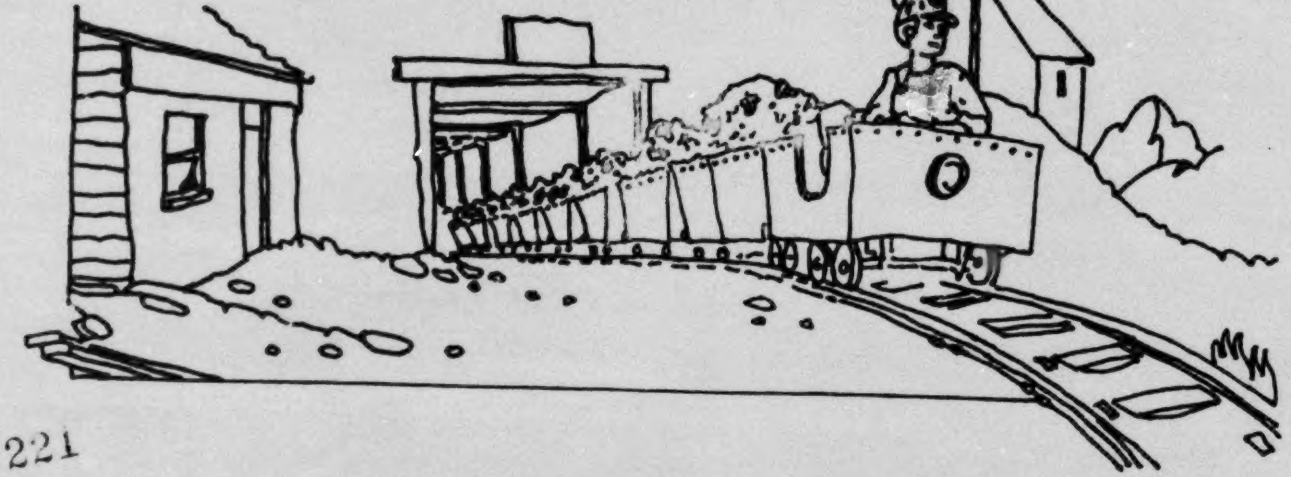
B. Procedure

1. Have children color the pictures
2. Have children draw their own pictures



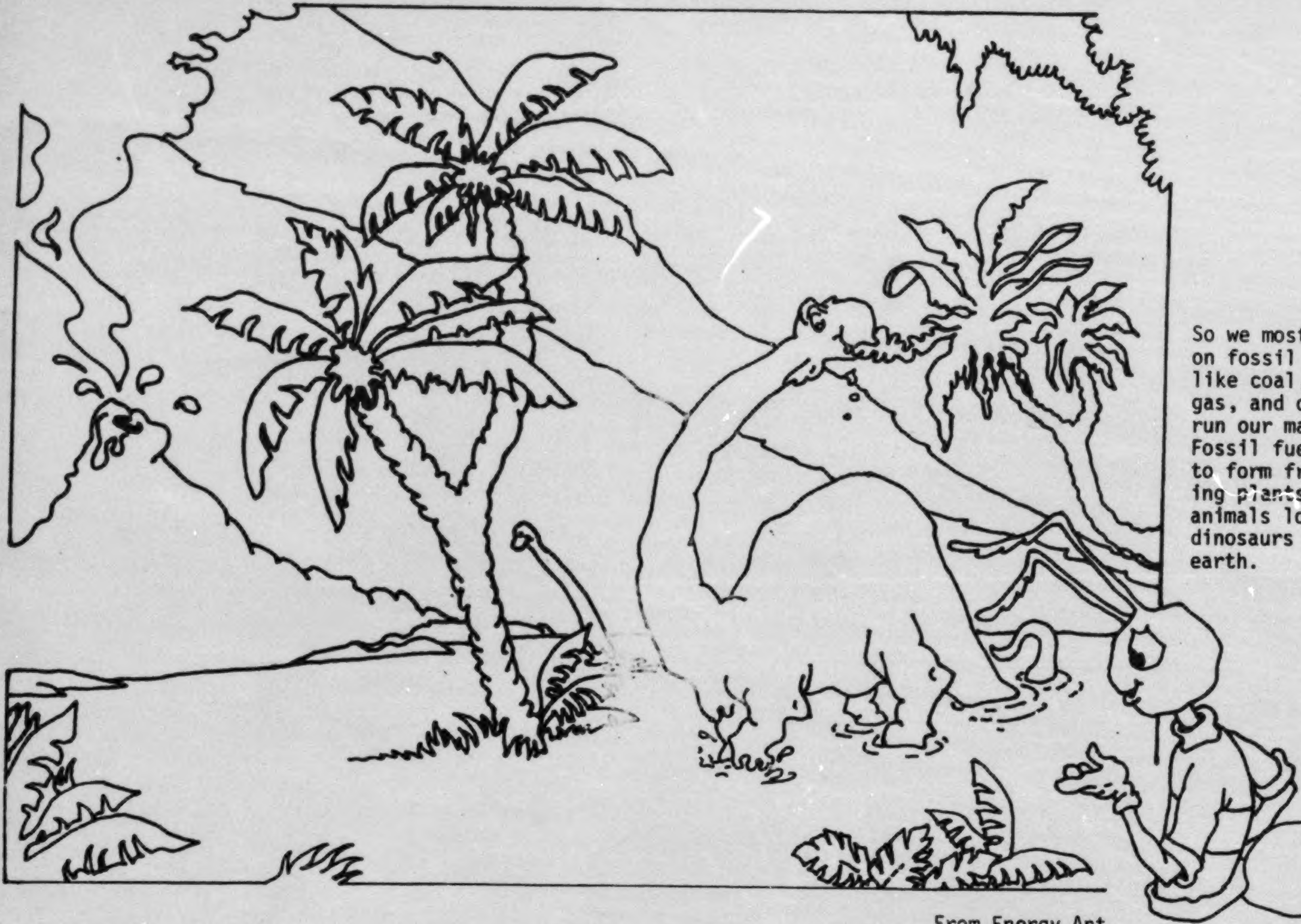
Coal

Student Material
(5 & 6 year olds)



CD 7-5

From Energy Ant



So we mostly depend on fossil fuels - like coal, natural gas, and oil - to run our machines. Fossil fuels began to form from decaying plants and animals long before dinosaurs roamed the earth.

CD 7-6

From Energy Ant

assignment

Explaining Solar Power

I. Solar Energy Collection

A. Equipment and supplies needed

1. Shoe box
2. Brick
3. Aluminum foil
4. Sunshine

B. Procedure

1. Cover shoe box with foil inside and out
2. Place brick in shoebox
3. Place shoe box in sunshine
4. Let children explain what happens to the brick

II. Material absorption of solar energy

A. No equipment or supplies needed

B. Procedure

1. Allow the children to touch the soil, wood, building, rock, etc. first in a cool place, then a hot place
2. Let the children tell what they think happens

III. Solar Tea

A. Equipment needed

1. A quart jar with lid
2. 3 teabags
3. Water

B. Procedure

1. Place 3 teabags in a quart jar of water and put the lid on
2. Place jar in the sun for at least 30 minutes
3. Serve the tea

IV. Growing plants with and without solar energy

A. Equipment and supplies needed

assignment

Explaining Solar Power Continued

1. Seeds
2. Egg cartons for planting
3. Potting soil
4. Water

B. Procedure

1. Plant seeds in egg carton containers
2. When plants are well established put several in a dark place for at least a week, continuing to water them.
3. Compare and discuss need for light energy.

V. Coloring a picture about solar energy

VI. Solar Cooking

A. Make solar oven (see attached sheet)

1. Oven can be made of tag board or heavy cardboard instead of plywood.
2. Outside of oven and front lath are painted flat black.

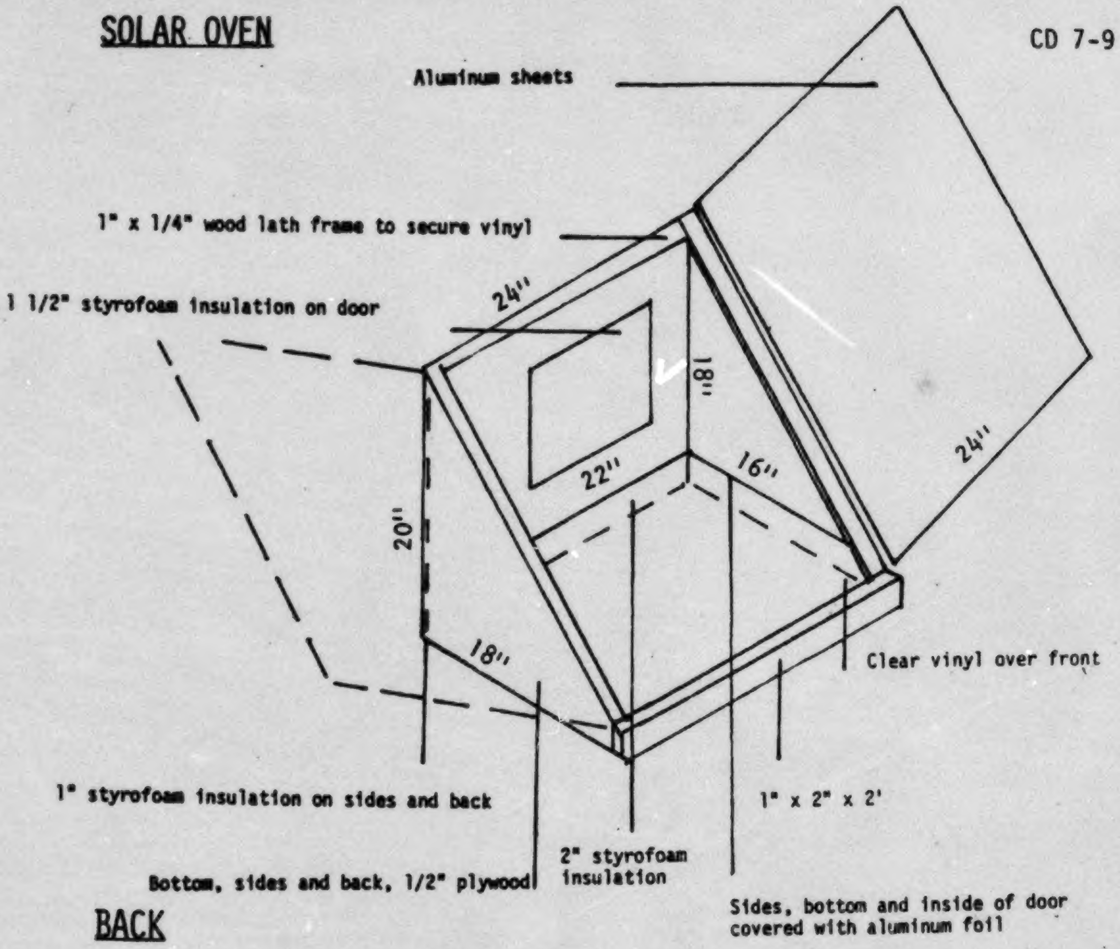
B. Bake cookies

1. Slice roll of prepared cookie dough and cut each slice into fourths.
2. Place cookies on a dark or black pan. (Dark teflon will work.)
3. Place in oven and bake. (About 20-25 minutes).

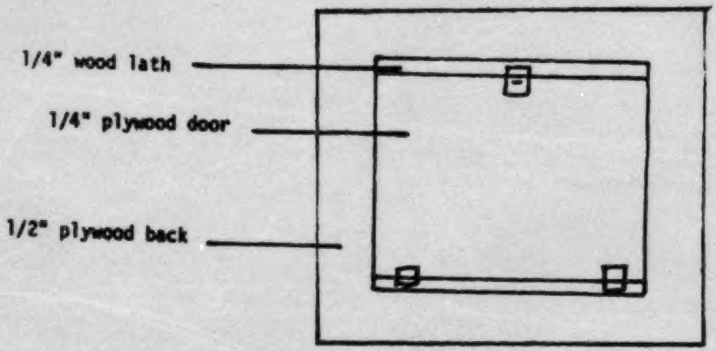
C. Alternative

1. Place chocolate chips on pan and put in oven.
2. Allow chips to melt (about 20 minutes).
3. After explaining to children what happened, let them spread chocolate on vanilla wafers.

SOLAR OVEN


Aluminum sheets
1" x 1/4" wood lath frame to secure vinyl
1 1/2" styrofoam insulation on door
24"
18"
22"
16"
24"
20"
18"
Clear vinyl over front
1" styrofoam insulation on sides and back
1" x 2" x 2'
2" styrofoam insulation
Bottom, sides and back, 1/2" plywood
Sides, bottom and inside of door covered with aluminum foil

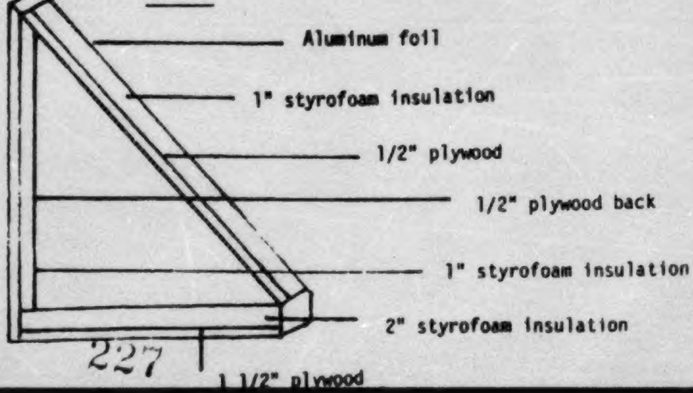
BACK


1/4" wood lath
1/4" plywood door
1/2" plywood back

Outside of oven and front lath frame are painted flat black

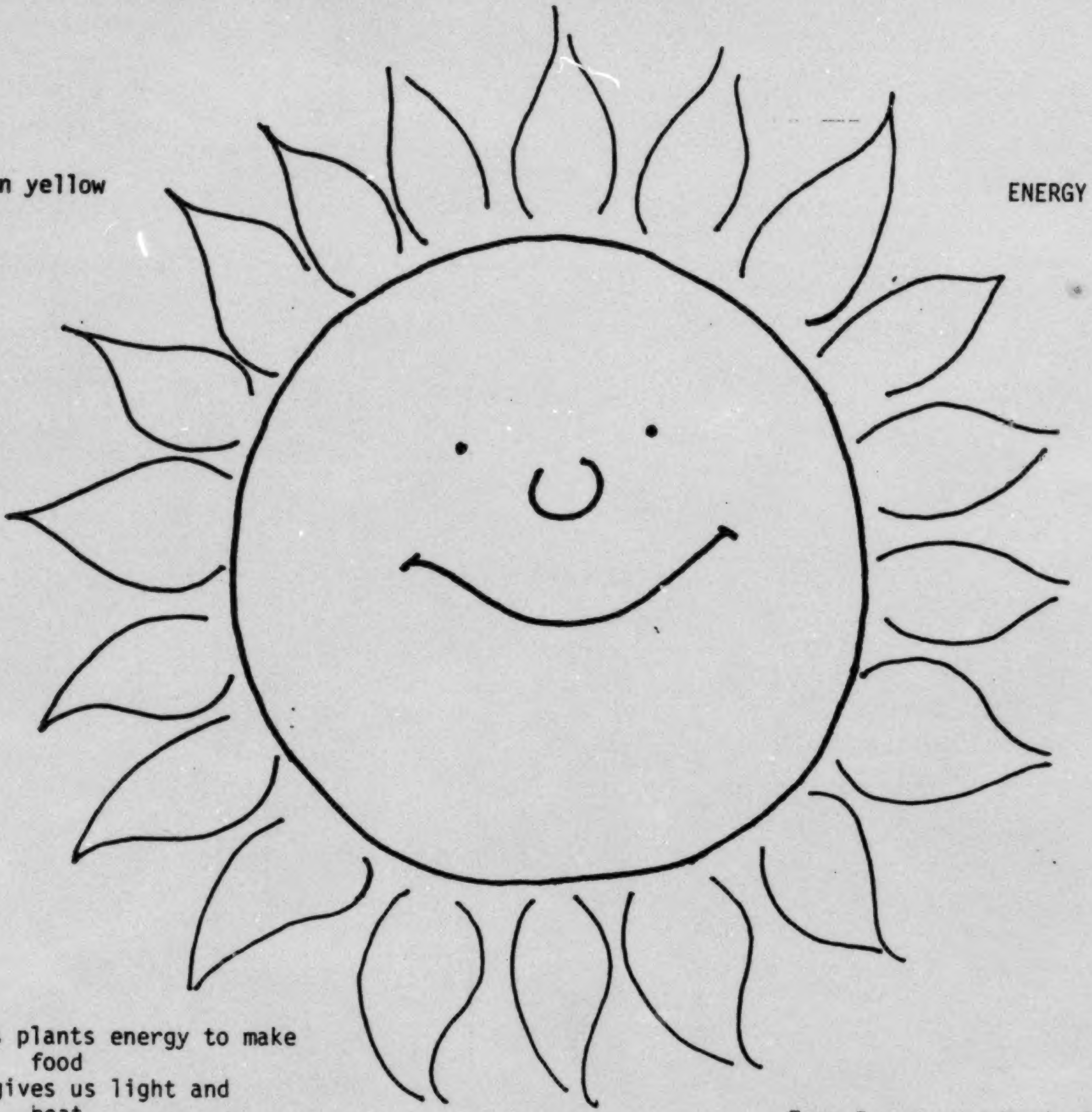
For cooking, a piece of black metal is placed on floor and food is cooked in a black pan

SIDE


Aluminum foil
1" styrofoam insulation
1/2" plywood
1/2" plywood back
1" styrofoam insulation
2" styrofoam insulation
1 1/2" plywood

ENERGY FROM THE SUN

Color the sun yellow



The sun gives plants energy to make food
The sun gives us light and heat

From Energy and Man's Environment

assignment

Explaining Electric Energy

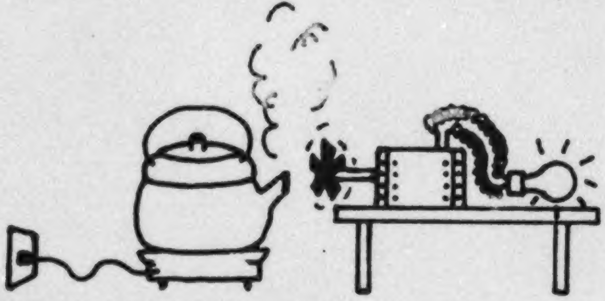
I. Electrical Generation

A. Supplies and equipment needed

1. Hot plate
2. Tea kettle with spout
3. Generator (D. C. hobby motor)
4. Pinwheel
5. Light (1.5 volt, 25mA, Leads)
6. Hook up wire (standard 22 gauge)

B. Procedure

1. Mount generator on board approximately 6" x 6"
2. Attach pin wheel to motor shaft
3. Attach light to the generator (motor) terminals with wire
4. Boil water, allow steam to strike and turn pinwheel



II. Things that use electricity

A. Supplies and equipment needed

1. Magazines
2. Scissors
3. Construction Paper
4. Glue

B. Procedure

1. Have children cut out picture of things that use energy
2. Children should glue them on the construction paper

III. "Where the Little Light Bulb Gets Its Juice" - See Attached

assignment

Explaining Electric Energy Continued

IV. Which things get their power from electricity

  A. Supplies and equipment needed

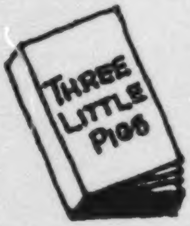
    1. Attached sheet
    2. Pencil

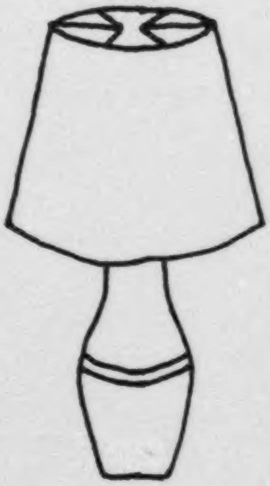
  B. Procedure

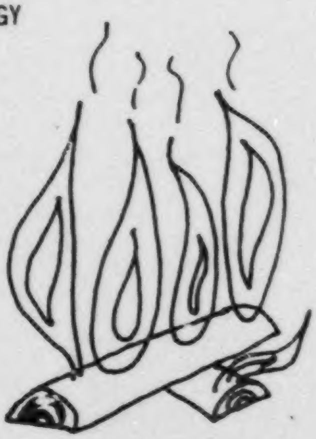
    1. Read the instructions to the young children
    2. Discuss their answers with them in a group

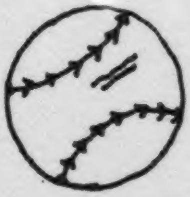
assignment

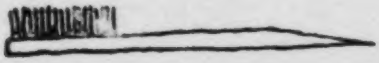
CIRCLE THE THINGS THAT USE ENERGY

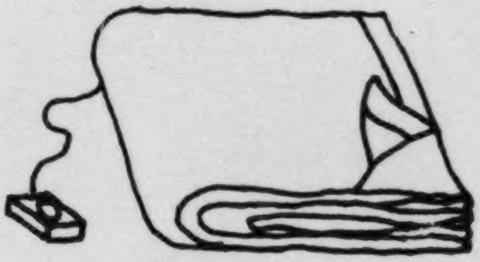


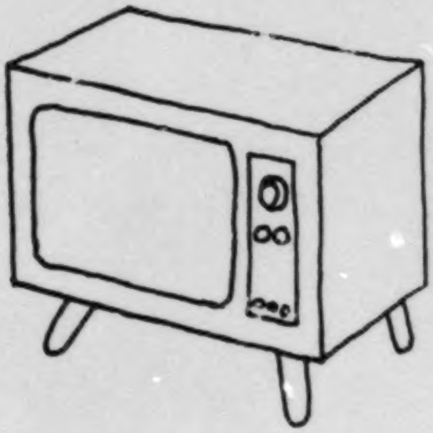


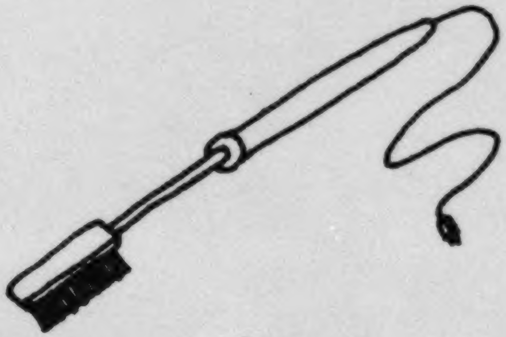






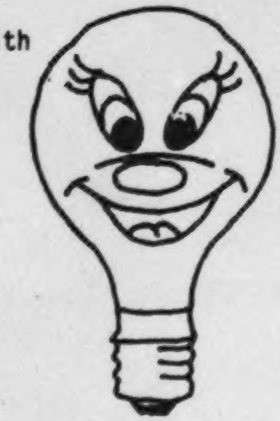






From Energy and Man's Environment, Energy and Conservation Education, Activites for the Classroom, Grades 1-3; 0224 S.W.Hamilton, Suite 301, Portland, Oregon 97201

Where the Little Light Bulb Gets Its Juice



Taken from Ala-Aids Pamphlet, developed for use with 3, 4 and 5 year olds for story hour.

Materials needed:

Light bulb (25 watt soft light recommended)
Porcelain socket
Extension Cord
Feedthrough cord switch
Cardboard shoe box
Pictures

Draw a face on light bulb, and make it light up by wiring extension cord into the porcelain socket, and wiring the cord switch into the extension cord. Make a power station out of the cardboard box (use cardboard tube out of wax paper, etc. for smoke stack), and set it over the cord.

Pictures needed:

Light outside porch on a house
Picture of a traffic light
Refrigerator light, or general illumination picture
Power lines
Meter
Outlet

The Ala-Aids Pamphlet has really good simplified drawings to use for making the pictures.

"Today, this little light bulb has asked me to come and tell you the story about where he gets his juice. This is his story . . . . ."

(Sing to the tune of "I'm a Little Teapot".)

Where the Little Light Bulb Gets Its Juice Continued

I'm a little light bulb
Out at night
This is my socket (screw bulb into socket)
This is my bright! (turn on light bulb)
When I get all teamed up
With the other guys
We electrify all your eyes!

"Light bulbs are all over the place. They keep people safe (1. Show picture) - give directions (2. Show picture), and they generally shed a little light on everything they can. (3. Show pictures)

Lets name other places we use light bulbs. (let children name others, such as car headlights, lamps, overhead lights, etc.)

But, where does the little light bulb get its juice? What makes the light come on?

It's not the light bulb that's important. It's the electricity behind the light bulb that's important!

You could say the electricity comes from the socket, but, how does the electricity get to the socket!?

Well, the electricity in your home comes from one of the giant turbine generators at one of our power stations. (Show box power station set over cord), (Also picture 4.)

The power station uses coal, gas or nuclear fuel to make electricity. Then, the wires carry the electricity to your home. (5. Show picture of power lines)

The electricity enters your home through a meter (6. Show picture). Its final destination is your outlet (7. Show picture) or this socket.

Where the Little Light Bulb Gets Its Juice Continued

We've talked about places where we use light bulbs, and now we know that light bulbs work by using electricity. What are some other ways we use electricity? (Let children name, show pictures of other uses, like water heater, TV, range, refrigerator, thermostat (to show heat and air conditioning, etc.)

We like to use electricity, and it's okay to use all the electricity that we need, but we don't want to waste electricity. That's why we turn off light bulbs when we don't need them. What are some other things we can do to keep from wasting electricity?"

(Suggest such things as: Turn off T.V. when no one is watching, turn water faucet all the way off, don't leave refrigerator door open while you decide what you want - decide, and then open the door, close the door to outside quickly when going in and out of doors, etc.)

My little light bulb has one more song for you . . . . .

I'm a little light bulb
Short and stout
When you don't need me
Put me out!

(May be followed by film "Electric Safety From A to Zap").

Taken from the Library Energy Programs, Alabama Power Company
Original Copyright: Con Edison of New York

assignment

Explaining Wind Energy

I. Coloring Sheet

II. Making Pinwheels

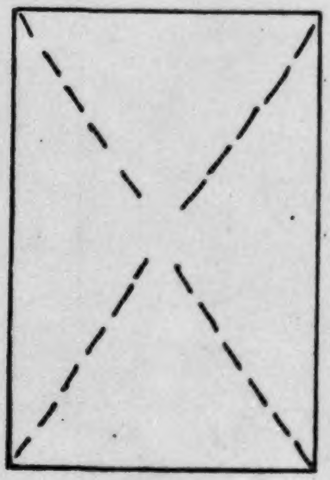
   A. Materials needed

      1. Straws (you may want to put clay in the end of your straw. It makes the pinwheel turn better).
      2. Pins
      3. Medium weight paper

   B. Procedure

      1. Draw pinwheels on a ditto and duplicate.
      2. Have children cut around pinwheel and cut on dotted lines taking care not to cut into the center.
      3. Fold one corner of each cut area towards center.
      4. Pin on straw.

III. Make a kite with children and fly it



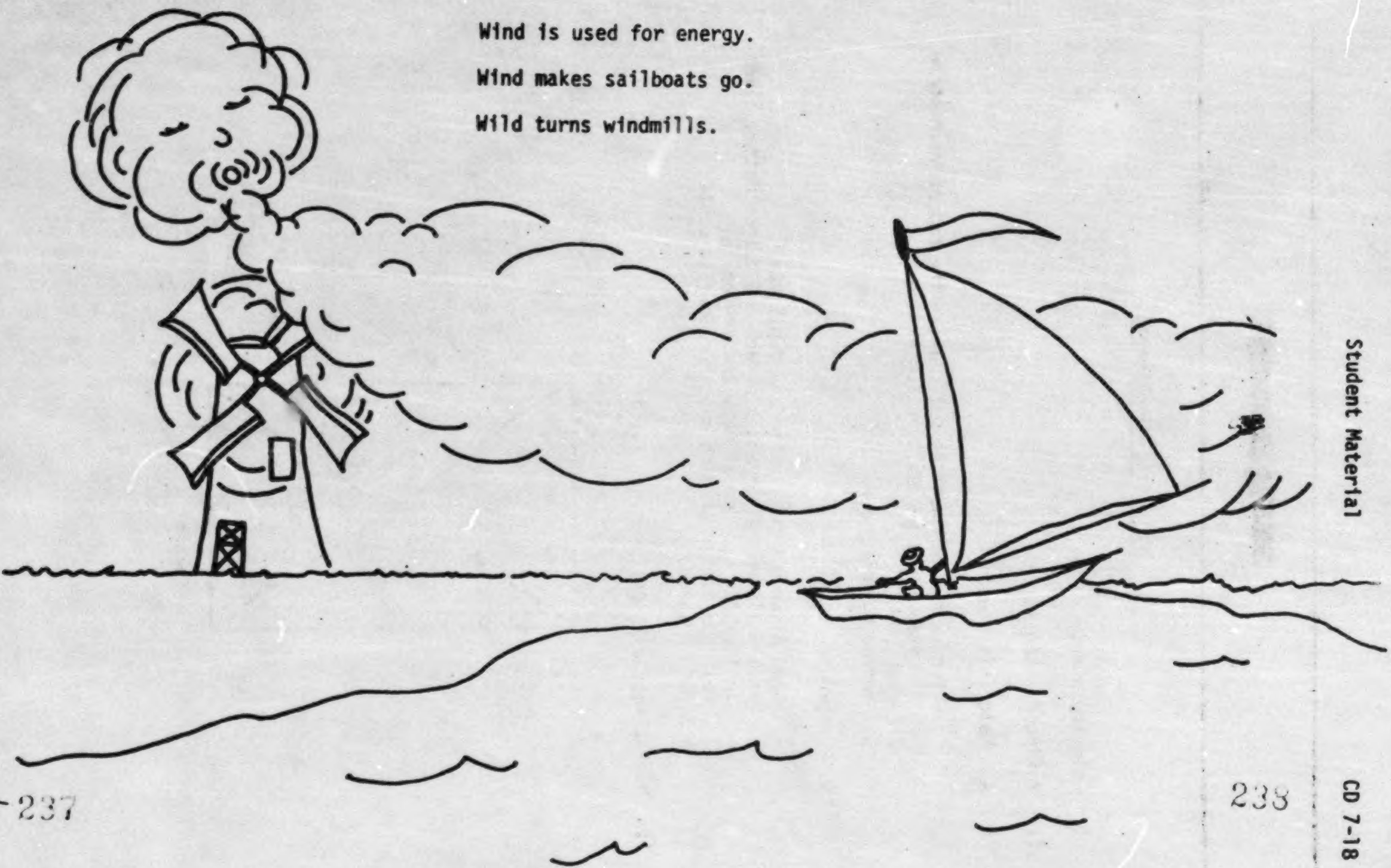
Pinwheel

WIND ENERGY

Wind is used for energy.

Wind makes sailboats go.

Wild turns windmills.



Student Material

CD 7-18

From Energy and Man's Environment

assignment

This is an adaptation of the Energy Trip Ticket Game from Energy & Man's Environment.

To help the children to be aware that it takes a lot of energy for people to have and do things, play the following game:

A. List several places the children go in school and charge one energy ticket for the cost of each. Example:

1. Drinking Fountain
2. Restroom
3. Snack Time
4. Recess or Outdoor Play
5. Other

B. Duplicate the standardized energy tickets and give each child 50 tickets. The child's name should be on each of the tickets. Each time the child takes a trip, it costs one energy ticket. Place a folder or box on or near the door and have students put tickets there for collection.

Keep a record of how many tickets the students have left each day. Which students are wasting energy? Which children are conserving energy? How are they doing it? Also discuss energy saving ideas for tips in the room (e.g. at recess I can get a drink, go to the bathroom for 1 ticket. Otherwise it would cost me three tickets if I did them one at a time).

C. Discuss the idea that one trip can accomplish a lot.

D. On the third day, discuss the idea of running out of energy tickets. There are no energy tickets left for the rest of the week. What can we do to save? What will it cost?

Be sure to consider that it takes energy to supply the things people use to make their life easier and more comfortable. We have to conserve energy rather than waste it.

ENERGY TRIP TICKET ________________ Name	ENERGY TRIP TICKET ________________ Name	ENERGY TRIP TICKET ________________ Name
ENERGY TRIP TICKET ________________ Name	ENERGY TRIP TICKET ________________ Name	ENERGY TRIP TICKET ________________ Name
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ENERGY TRIP TICKET ________________ Name	ENERGY TRIP TICKET ________________ Name	ENERGY TRIP TICKET ________________ Name

From Energy and Man's Environment

Child Development Resources

Proctor & Gamble, "Diapering Cost - Comparison Project", P.O.Box 599, Cincinnati, Ohio 45201

DEAR GARBAGE MAN, Eugene Zion, Scholastic Books, Harper-Row, 1957

Energy Activities With Energy Ant, Consumer Information Center, Pueblo, Colorado 81009, Catalogue #640F.

THE ADVENTURES OF MINI VOLTS AND WASTEY WATTS, an energy conservation program for preschool youngsters, Energy and Man's Environment, 0224 S.W. Hamilton, #301, Portland, Oregon 97201.

Energy and Man's Environment, Energy and Conservation Education, Activities for the Classroom, Grades 1-3; 0224 S.W. Hamilton, Suite 301, Portland, Oregon 97201.

Naturally Powered Old Time Toys: How to Make Sun Yachts, Sail Cars, a Monkey on a String, and Other Moving Toys, Marjorie Henderson and Elizabeth Wilkinson, Lippincott, 1978.

Library Energy Programs, Alabama Power Company, P.O.Box 2641, 600 N. 18th St., Birmingham, Alabama 35291.

WHERE THE LITTLE LIGHT BULB GETS ITS JUICE
Consolidated Edison Company of New York
Culver Publication, Inc., 1976.

Your Energy Budget Manager
Public Service Company of Colorado
Public Relations Division - 550-15th St., Denver, Colorado 80202.

FILM:

"Electric Safety From A To Zap". Grade levels 1-7 available for free loan from Public Service Company of Colorado to teachers and schools in all communities served by Public Service Company and its subsidiaries, Cheyenne Light, Fuel and Power Company and Western Slope Gas Company.

INDEX

Section - Personal and Family Relations

Unit I. - Standard of Living

Unit II. - Community Involvement in Government Rationing, Pollution

Unit III. - Power Plants

Unit IV. - Population

Unit V. - Pollution

Unit VI. - Wise Use of Decreasing Natural Resources

Unit VII. - Transportation

Unit VIII.- Low Energy Recreation

Unit IX. - Recycling

Unit X. - Conserving Energy

Unit XI. - Future Energy Sources

Unit XII. - Resources for Personal and Family Relations

unit of instruction:
Standard of Living

subject area:
Personal and Family Relations

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

The student will be able to analyze the importance of managing time, energy, economic and environmental resources.

SPECIFIC OBJECTIVES

Given the opportunity to participate in a values clarification exercise, the student will illustrate the relationship between standard of living and energy use.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES

Discuss the dependence of the American way of life on energy sources.

Use the bulletin board "If We Don't Wise Up - It Will Be 'Lights Out' For a Lifetime" as a discussion guide. An illustration of the bulletin board idea is included at the end of this unit.

Cite the technological advances, dependent on energy, which have influenced the quality of life and lifestyles of the American consumer.

Have the students interview persons over age sixty-five to find out what appliances, utilities and equipment taken for granted in today's home were first introduced during their lifetimes. Ask them to describe the changes these technological advances have made in their patterns of living.

EVALUATION TECHNIQUES

Students will be able to list ways they can conserve energy in leisure time activities following completion of this decision making activity.

SUGGESTED MATERIALS AND RESOURCES

Energy and Conservation Education: Activities for the Classroom, Grades 10-12, "Uses", Activity #12, Energy & Man's Environment.

DEVELOPED BY

Susan Stone
Jon Thompson

ADAPTED FROM:

Energy & Man's Environment

assignment

Leisure-Time Activities

Level II

1. Make a list of five leisure time activities you enjoy doing.
2. Rank in order each activity from the most important to the least important.
3. Next to each item, place a dollar sign ($) if the activity costs money each time it is performed.
4. For each item assign a mechanical energy point value. Give the activity a 3 if it requires a major amount of mechanical energy consumption, a 2 if a moderate amount of energy consumption and a 0 if it doesn't require any artificial energy sources at all.
5. For each item give 3 points for performing the activity a lot, 2 points if the activity is performed occasionally, and 1 point if performed seldom.
6. Total the points for each row. Which activities use the most energy?
7. Read the article, "The Nightmare Life Without Fuel".
8. Assume that a severe energy crisis now exists and that all people must conserve as much energy as possible. Cut back your leisure time activities at least 50%.

Class Discussion for Follow-Up:

Suppose you live in the situation described in Asimov's article. Which of the leisure-time activities on your list would you be able to keep? What activities could you do?

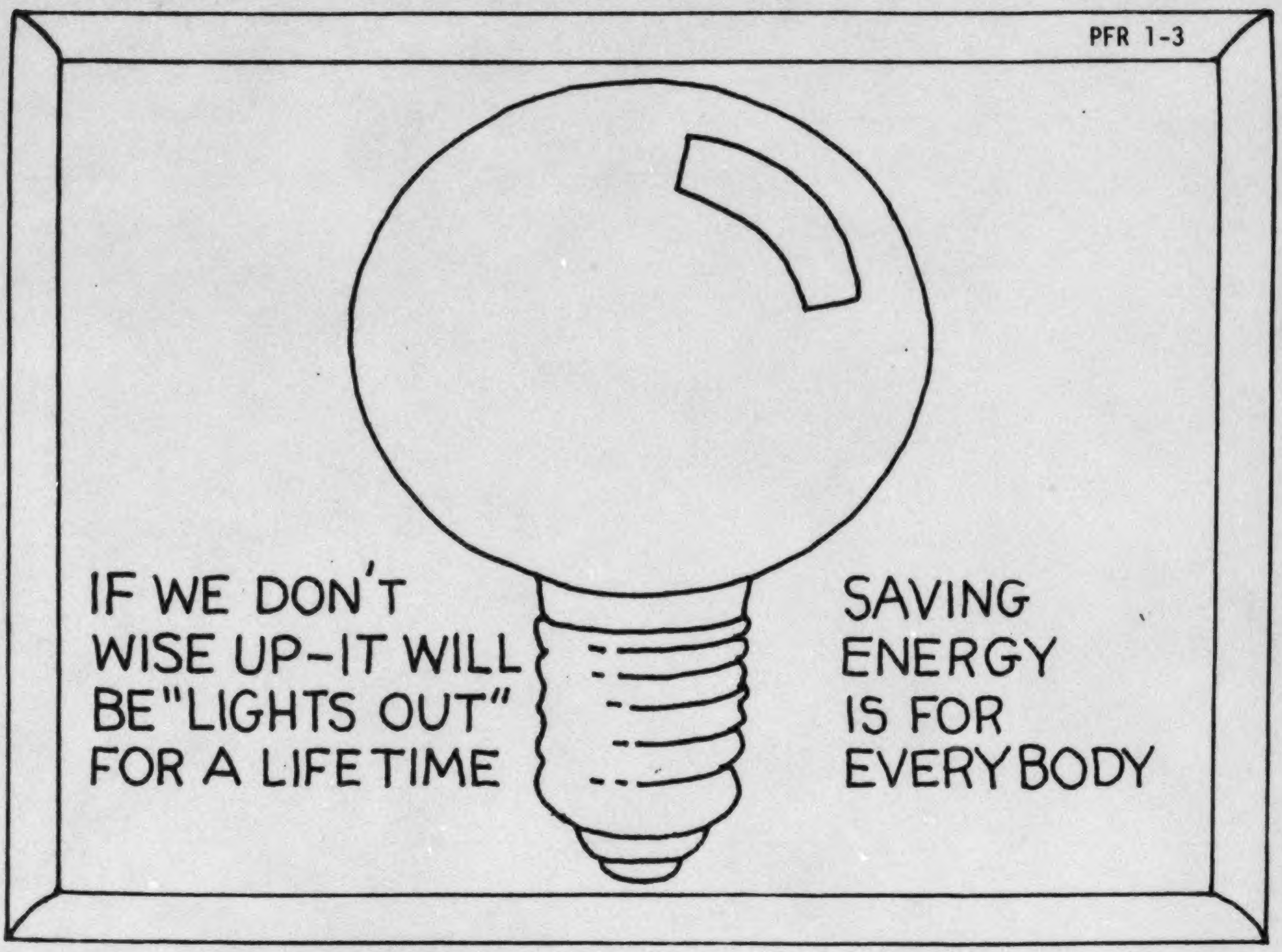
Would you be willing to reduce by 50%? Why or why not?

How did you conserve energy? Which items did you reduce? Prioritize your list.

Does your priority ranking affect your decisions? If so, how?

Does the $ value have any effect on energy usage?

What types of activities can we do that are fun and do not require much use of artificial energy sources?


IF WE DON'T WISE UP-IT WILL BE "LIGHTS OUT" FOR A LIFETIME
SAVING ENERGY IS FOR EVERYBODY

Objectives:
1. Build awareness of the importance of individual energy conservation
2. Encourage students to use energy wisely

Appropriate Programs:
- General Homemaking or Family Living
- Household Equipment
- Home Management
- Consumer Education

Preparation: Cut out a silhouette of a light bulb from black or deep gray construction paper. Use a felt-tip marker to draw the lines on the bottom of the bulb and letter the bulletin board as illustrated.

Learning Activities:
1. Survey the students. How many of them are using energy-saving methods to reduce the use of electricity, gas or other forms of energy? Make a list of these energy conservation habits.
2. Have students do library research to explore the aspects of the energy situation. What federal policies are being discussed? How much responsibility should consumers assume in reducing energy usage? How will the rise in cost of electricity, gas and other forms of energy affect consumers and industry?
3. Encourage the students to plan a school or community-wide campaign to encourage energy efficiency. Make a list of the community efforts which are already in effect to reduce energy demand.

Reprinted From The Book of Classroom Games and Bulletin Board Ideas, brought to you by the Editor of CO-ED and FORECAST For Home Economics, written by Mary Anne Symons Brown (c) 1978 by Scholastic Magazines, Inc.

unit of instruction:	subject area:	suggested for:
Community Involvement in Government Rationing, Pollution	Personal and Family Relations	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

The student analyzes the importance of managing time, energy, economic and environmental resources.

SPECIFIC OBJECTIVES

Given the opportunity to role play as a Community Energy Advisory Board, students will deal with transportation and energy and make recommendations to a mock town council on how to handle the situation.

BACKGROUND INFORMATION

Background information about the energy problem as it affects transportation - gas, cost, pollution control. Information from community members who fit the roles identified in this exercise. This can be obtained by interviewing people in the community.

SUGGESTED ACTIVITIES LEVEL II

Spend one day on background information acquainting students with the roles they are going to play and give them some time to become familiar with those roles.

This is a role playing exercise where members of the Community Energy Advisory Board are considering the best means of managing the community's transportation service in light of the energy crisis. The questions to be considered include:

a. Should the present system be maintained (private cars, limited public transportation)?

b. Should gas rationing be instituted?

c. Should additional public transportation be provided?

The characters include:

a. Rikki Sever - Head of the CEA Board

b. Florence Wheeler - A local bicycle shop owner

c. Busby Tour - Runs the local school transportation system

d. Anthony Tanke - A service station owner

e. Nancy Raider - Consumer education

f. Burt Conners - Who is on the committee for the purpose of meeting Nancy Raider

Continued

Other members of the class may take on the job of interested community members attending the meeting and evaluate the cooperation and commitment to solving the problem among committee members. Time: 2 days

Extension:

Include an assignment to attend a town council meeting, or a similar meeting where growth and energy usage are likely to be discussed.

EVALUATION TECHNIQUES

By using the group process observation report included in the packet, students will evaluate the cooperation and commitment of the board members. Students will also be asked to describe the particular interest each board member is promoting.

Level II students will have their choice of doing either a written or oral report based on their learnings at the town council or energy related meeting.

SUGGESTED MATERIALS AND RESOURCES

Each student in the role playing exercise may want to make a poster to further support his/her position.

J.C. Penney's "Energy Issues and Action" Packet

"The Energy Mess", Time, July 2, 1979.

Local newspaper articles on mass transit systems in major cities in your area.

DEVELOPED BY

J.C. Penney's

REVISED BY

Susan Stone

COMMITTEE MEETING PROBLEM SHEET

COMMUNITY ENERGY ADVISORY BOARD

You are a member of the Community Energy Advisory Board. In light of President Carter's call for the passage of a comprehensive national energy program, a keystone of which will be conservation, CEA was established by the Town Council. Cognizant of the differing perspectives on the President's energy program across the country -

- economists who are concerned about the relationship of government conservation measures and economic growth

- business executives who are concerned about the effect of such a policy upon their freedom to make decisions based upon market signals

- environmentalists who are concerned with the utilization of fuels which may affect environmental standards by degrading air quality

- consumers who envision lifestyle changes as fuel bills increase and transportation patterns are affected

- the CEA was authorized to make specific recommendations for dealing with the energy crisis as it impacts on the community. There are no organized consumer interest groups to focus on the energy issue in your area. The Community Energy Advisory Board will be dealing with the topic of transportation and energy (energy usage) at this meeting and has been asked to have specific suggestions prepared for presentation at the next Town Council meeting.

The Town Council has advised your board to consider the best means of managing the community's transportation system in light of the energy crisis.

1. Should the present system be maintained (emphasis on private cars, limited public transportation)?
2. Should gas rationing be instituted?
3. Should additional public transportation be provided?

Heading the CEA Board is Rikki Sever who will report the recommendations to the Town Council.

The members of the CEA Board in addition to Rikki Sever include Florence Wheeler, Busby Tour, Nancy Raider, Anthony Tanke, and Burt Conners.

Committee Meeting Instruction for Playing a Role

Burt Conners

Please note that the roles have been purposely stereotyped to make a point. These descriptions should not be construed negatively, as that was not the intent!

1. Do not disclose your role description by saying what you do for a living, etc.
2. Read your description carefully and play the role conscientiously.
3. Put yourself into the role that you are given, but do not overact.
4. Be natural, but emphasize behavior aimed at fulfilling your role.
5. The description below represents a somewhat general perspective on the issue. Please add any points which you feel are pertinent and timely to the role you are playing.

You are not really concerned with the work of the Community Action Board. You joined for only one reason, to meet Nancy Raider and eventually ask her out. During the meeting you plan to agree with, and support every point that Nancy makes. Your behavior is guided by your desire to impress Nancy Raider.

- -

Committee Meeting Instruction for Playing a Role

Rikki Sever

Please note that the roles have been purposely stereotyped to make a point. These descriptions should not be construed negatively, as that was not the intent!

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4. Be natural, but emphasize behavior aimed at fulfilling your role.
5. The description below represents a somewhat general perspective on the issue. Please add any points which you feel are pertinent and timely to the role you are playing.

Your role is to conduct the meeting and insure that everyone has a chance to present their perspective on the energy/transportation issue. Your group will have 15 minutes for this activity. It will not be necessary for the group to reach a decision.

Personally, you do not believe that there is an energy crisis. You've heard the story about shortages and oil crises before. In addition you've made heavy investments in an energy-intensive way of life. Public transportation in this town is limited and you've got a "gas-guzzler" in addition. Any gas-guzzler tax might penalize a large family that simply needed a bigger car for comfortable transportation.

Committee Meeting Instruction for Playing a Role

Nancy Raider

Please note that the roles have been purposely stereotyped to make a point. These descriptions should not be construed negatively, as that was not the intent!

1. Do not disclose your role description by saying what you do for a living, etc.
2. Read your description carefully and play the role conscientiously.
3. Put yourself into the role that you are given, but do not overact.
4. Be natural, but emphasize behavior aimed at fulfilling your role.
5. The description below represents a somewhat general perspective on the issue. Please add any points which you feel are pertinent and timely to the role you are playing.

You are a Consumer Educator, active in community affairs and concerned about consumer issues. Since there are no consumer groups in your community, you feel that your participation on the CEA Board will call attention to the need for a permanent Consumer Advisory Board to the Town Council and you would like to become appointed to the Board. You contend that waste has been built into the values of an ever expanding American economy. In the past, technology provided answers but there may be no wondrous new energy source when the old form runs out.

Committee Meeting Instruction for Playing a Role

Anthony Tanke

Please note that the roles have been purposely stereotyped to make a point. These descriptions should not be construed negatively, as that was not the intent!

1. Do not disclose your role description by saying what you do for a living, etc.
2. Read your description carefully and play the role conscientiously.
3. Put yourself into the role that you are given, but do not overact.
4. Be natural, but emphasize behavior aimed at fulfilling your role.
5. The description below represents a somewhat general perspective on the issue. Please add any points which you feel are pertinent and timely to the role you are playing.

You own a gas station and are an active community leader. You are in favor of maintaining the status quo as much as possible since you are concerned about your economic future should any changes be imposed. You are opposed to the gas tax since it is a direct tax on the consumer at the gas pump. Besides, the Administration had proposed a tax on crude oil that was expected to increase gasoline prices by 5-7 cents/gallon by 1980.

You feel that many Americans cannot or will not alter their car driving habits as the cost of gasoline alone will not reduce consumption.

Committee Meeting Instruction for Playing a Role

Busby Tour

Please note that the roles have been purposely stereotyped to make a point. These descriptions should not be construed negatively, as that was not the intent!

1. Do not disclose your role description by saying what you do for a living, etc.
2. Read your description carefully and play the role conscientiously.
3. Put yourself into the role that you are given, but do not overact.
4. Be natural, but emphasize behavior aimed at fulfilling your role.
5. The description below represents a somewhat general perspective on the issue. Please add any points which you feel are pertinent and timely to the role you are playing.

You run the local school transportation service. If you can encourage the CEA Board to recommend additional public transportation, you might have the opportunity to gain the franchise since you have the demonstrated expertise in the field. Ad hoc car-pooling, you intend to argue, is a hit and miss proposition. You might also point out that, although the President's energy message omitted reference to developing mass transit as a means of saving fuel per se, he did say that "this is a separate item that will be handled under the Transportation Department".

Committee Meeting Instruction for Playing a Role

Florence Wheeler

Please note that the roles have been purposely stereotyped to make a point. These descriptions should not be construed negatively, as that was not the intent!

1. Do not disclose your role description by saying what you do for a living, etc.
2. Read your description carefully and play the role conscientiously.
3. Put yourself into the role that you are given, but do not overact.
4. Be natural, but emphasize behavior aimed at fulfilling your role.
5. The description below represents a somewhat general perspective on the issue. Please add any points which you feel are pertinent and timely to the role you are playing.

You are the mother of teen-age children. You are a partner in a local bicycle shop. Everyone in your family rides a bike and you think that bike riding is both healthy and ecologically sound. Although gas rationing was not mandated in the President's Energy Program, it is a "viable alternative" and could be imposed without Congressional approval if the President declared a national emergency. If gas rationing were to be instituted, your business would probably pick up.

Group Process Observation Report

As a group process observer at the meeting of the Community Energy Advisory Board please answer the following questions. Be prepared to summarize your responses to each question when you report back to the group.

1. How much cooperation did you observe among the Community Energy Advisory Board members?

   Place an X on the line closest to the side (or somewhere in between) which best describes the intensity of your feelings.

   Low degree of Cooperation ______________________________ High degree of Cooperation

2. How committed were each of the members to a common goal? Place an X on the line closest to the side (or somewhere in between) which best describes the intensity of your feelings.

   Low degree of Commitment __________ Rikki Sever __________ High degree of Commitment

   Low degree of Commitment __________ Florence Wheeler __________ High degree of Commitment

   Low degree of Commitment __________ Busby Tour __________ High degree of Commitment

   Low degree of Commitment __________ Nancy Raider __________ High degree of Commitment

   Low degree of Commitment __________ Anthony Tanke __________ High degree of Commitment

   Low degree of Commitment __________ Burt Conners __________ High degree of Commitment

3. Did you think that any of the individuals listed below had a particular interest to promote? If so, what was that interest?

   a. Rikki Sever ______________________________

   b. Florence Wheeler ______________________________

   c. Busby Tour ______________________________

   d. Nancy Raider ______________________________

   e. Anthony Tanke ______________________________

   f. Burt Conners ______________________________

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unit of instruction:	**subject area:**	**suggested for:**
Power Plants	Personal and Family Relations	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

The student analyzes the importance of managing time, energy, economic and environmental resources.

SPECIFIC OBJECTIVES

Given the opportunity to role play, the student will be able to describe reactions to the possibility of a power plant being built near the student's home.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES LEVEL I

Use the Energy Environment Game information available from Edison Electric to evaluate the points of view of role profiles and discuss their validity as objectively as possible. A filmstrip and record included with the game might serve as a good discussion catalyst and make students think about role differences. The complete simulation game takes 7-10 days to complete.

SUGGESTED ACTIVITIES LEVEL II

Review the roles presented in the Energy Environment Game and discuss the validity of these roles with the students. Have the students discuss different sources of energy that are common to your area. Choose possible plant locations.

Lead a discussion on the characteristics of various types of fuel that could be used in the plants, advantages, and disadvantages, environmental impact, safety (nuclear, hydroelectric, coal).

Interview community members who have a concern for new energy development to become familiar with roles for the role plays. Some possibilities could include:

a. Conservationist - environmentalists
b. Business and finance people
c. Energy and power related businesses
d. Organized labor
e. Realtors
f. Homemakers

If it is not possible for students to interview these people, they could be invited into the classroom for a panel discussion, after which students could interview them.

Have students role play responses from the various concerned citizens.

Following the role play exercise, students should discuss their own reaction to having a power plant built near their home.

Continued

EVALUATION TECHNIQUES

Evaluate students' involvement and participation in the project based on the background knowledge demonstrated in the role play and the discussion on their own reaction to the power plant following the role play.

SUGGESTED MATERIALS AND RESOURCES

Energy Environment Game, Edison Electric Institute, 1111 19th Street, N. W., Washington, D. C. 20036. (Check with your local electric utility first. They may be able to obtain the game for you.)

"More Electric Power: How on Earth Do We Get It?" Look, December 1, 1974, reprinted by Edison Electric Institute.

"Nuclear Nightmare", Time, April 9, 1979.

Films:

China Syndrome

Thine Is The Power: A Citizens Guide to the Nuclear Energy Debate 1977, 55 minutes, University of Illinois

DEVELOPED BY

Edison Electric Institute

REVISED BY

Susan Stone

background information

Level I information is included in the Energy Environment Game, which is based on society's demand for energy and its effect on the environment. The game revolves around an electric utility company's request to build a new power plant. A governor's commission considers the plans for a new plant, and an actual site for the plant in a series of open hearings and through citizen's task forces.

Level II information on various fuel sources and availability, advantages and disadvantages, environmental impact. Operation of various types of plants (nuclear, hydroelectric, coal).

unit of instruction:	**subject area:**	**suggested for:**
Population	Personal and Family Relations	Level II (Senior High)

UNIT OBJECTIVE

The student analyzes the importance of managing time, energy, economic and environmental resources.

SPECIFIC OBJECTIVES

The student will be able to correlate probable growth rates in population with growth rates in energy use and hypothesize about some possible tradeoffs that may become necessary.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITIES - Time: 2-3 45 minute class periods

Discuss the graphs by using the following guidelines:

1. By comparing population growth figures over three fifteen year periods, make a statement about the rate of population growth trend. Is it increasing? Decreasing? Stable?

2. Examine the graph Population Growth by Age Group. What conclusion do you reach about the percentage of the population that falls into the 20-35 age group? What significance do these conclusions have for future energy needs?

   The 20-35 age group influences economic activity much more than any other. It is during this period that marriage and the establishment of a household usually occur. Most parents of children born fall within this group. Equipping new and expanding households requires purchase of a wide range of products. During this period the need for goods and services is greatest. Clearly, the economic activity required to satisfy these needs must increase at a rapid rate. And, as a result, the needs for energy will expand rapidly too.

   At this point discussion could turn to include offering financial incentives for limiting family size. This discussion could include tax writeoffs, legislation involved in this type of incentive, the effect on family size and the energy requirement change for this size family.

3. Examine the graph on Per Capita Use of Energy. The use of energy has doubled in the last 30 years. It appears likely that it will more than double in the next 30 years. Why does the use of energy growth rate outstrip the population growth? How is this affected by standard of living? What conclusions can be reached about energy use and its effect on the family in the future?

Continued

EVALUATION TECHNIQUES

Given the opportunity to complete several tasks, students will demonstrate knowledge gained by their participation in a role play situation, followed by a discussion on rapid growth in both population and energy and the tradeoffs that will be made necessary by this situation.

SUGGESTED MATERIALS AND RESOURCES

Energy and Conservation Education: Activities for the Classroom, Grades 10-12 Activity #8, "Future", Energy & Man's Environment

Outlook for Energy in the U. S. to 1985, Chase Manhattan Bank, 1972

Journal of Home Economics, "Energy and Families: The Crisis and Response", January 1976

DEVELOPED BY

L. B. Knight - Energy & Man's Environment

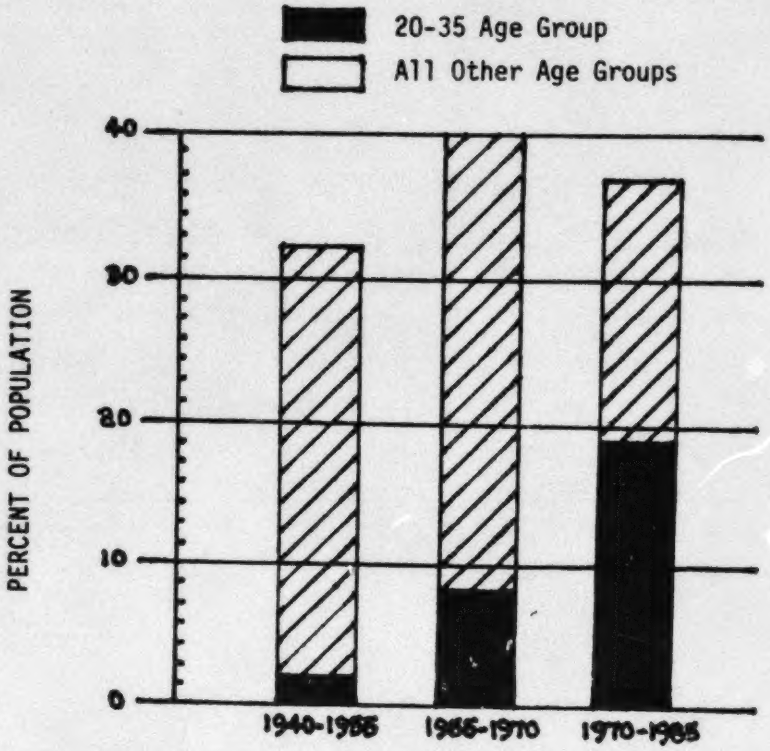
REVISED BY

Susan Stone

background information

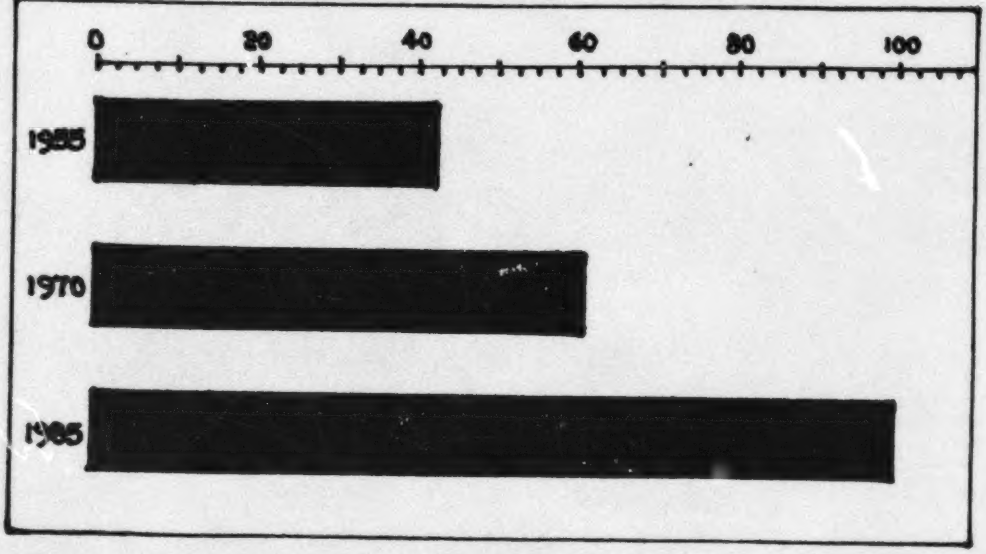
Information provided in Energy & Man's Environment's Energy and Conservation Education: Activities for the Classroom, Grades 10-12, Activity #8 "Future". The graphs in this activity show population growth, projected growth through 1985, population growth by age group over the same period, and per capita use of energy. The graphs should be made in advance and displayed on a bulletin board where all students can see them. The graphs may then be used as an aid in discussing the following activity.

POPULATION GROWTH



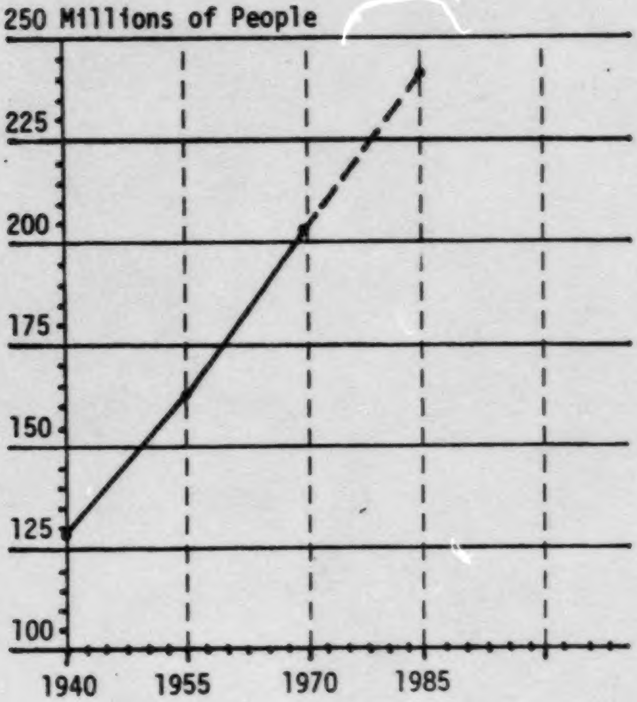
PER CAPITA USE OF ENERGY

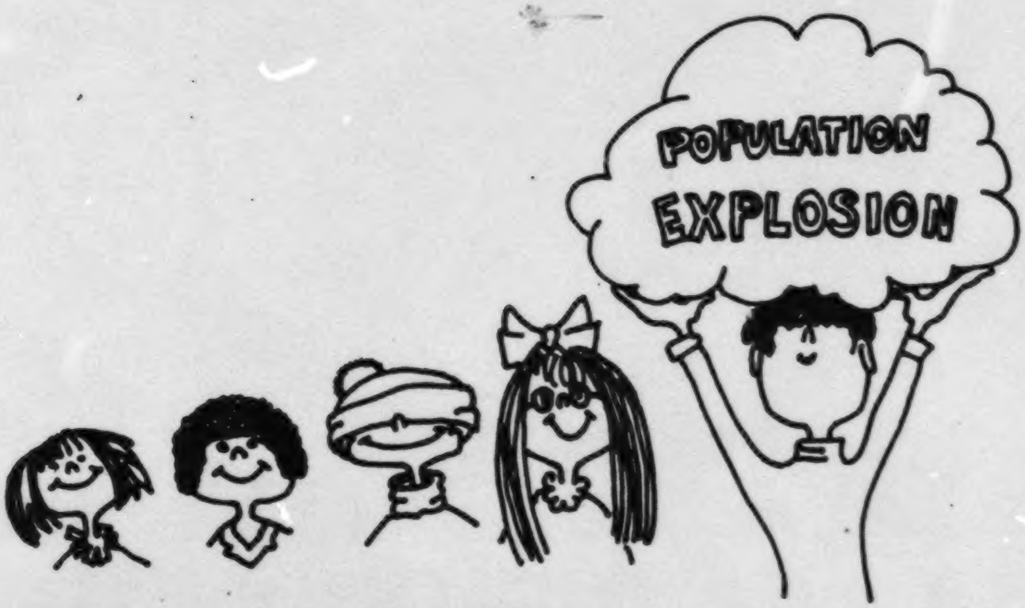
Barrels of Oil Yearly Per Capita



Source: "Outlook for Energy in the United States to 1985"
The Chase Manhattan Bank, 1972

U. S. RESIDENT POPULATION




POPULATION
EXPLOSION

Source: "Outlook for Energy in the United States to 1985"
The Chase Manhattan Bank, 1972

unit of instruction:	**subject area:**	**suggested for:**
Pollution	Personal and Family Relations	Level II (Senior High)

UNIT OBJECTIVE

The student analyzes the importance of managing time, energy, economic and environmental resources.

SPECIFIC OBJECTIVES

Given the opportunity to do research in an area of particular interest, the student will be able to list and explain the issues and tradeoffs involved in meeting energy needs and protecting the environment.

BACKGROUND INFORMATION - See Attached

SUGGESTED ACTIVITY - **Time**: Class time for research plus 1-2 days for oral reports

This may be either an individual or group project.

Students will research an area of interest related to issues and tradeoffs involved in energy needs and protecting the environment. They will prepare an oral and written report discussing both sides of the issue they have chosen and conclude with their own personal belief about how the situation should be handled. The report should be related to the effect it has on individuals and families.

EVALUATION TECHNIQUES

The student will be evaluated on the amount of information gathered, reliability of sources, oral presentation, knowledge of subject and use of class time spent in preparing the report.

SUGGESTED MATERIALS AND RESOURCES

Energy and Man: Technical and Social Aspects of Energy, M. Granger, Moran, ed., IEEE Press, 1975

Ecology and Economics: Controlling Pollution in the 70's, Marshall I. Goldman, Prentice-Hall, Inc.

Energy and Conservation Education: Activities for the Classroom, Energy & Man's Environment, Grades 10-12, #7 "Uses"

The Economics of Environmental Protection, Donald N. Thompson, Winthrop Publishers, 1973

"The Great Energy Mess," Time, July 2, 1979

DEVELOPED BY

Susan Stone

background information

Following is a list of possible topics related to issues and tradeoffs involved in meeting energy needs and protecting the environment. These topics should be of interest to consumers who will have to change their lifestyles due to the energy situation.

1. Gas Rationing - Prices and availability of products due to gas shortages
2. Time Management - Related to restrictions on energy usage
3. Energy conservation in the home
4. Nuclear Power - and its effect on families, safety, environment
5. Alternative Sources of Energy - Solar, coal, hydroelectric power, etc. and their effects on families, safety, environment

Research an area of interest.
Prepare an oral and written report discussing both sides of the issue you have chosen. Conclude with your own personal belief about how the situation should be handled.

unit of instruction:	**subject area:**	**suggested for:**
Wise Use of Decreasing Natural Resources	Personal and Family Relations	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

After completion of this unit, the student should be able to demonstrate ways to reduce personal or household energy consumption.

SPECIFIC OBJECTIVES

After studying this unit, the student will be able to explain how to read utility meters and to apply the methods used in meter reading to actual energy consumption in household appliances.

SUGGESTED ACTIVITIES - See Assignments Attached

SUGGESTED MATERIALS AND RESOURCES

Contact your local utility company.

"How to Understand Your Utility Bill", U. S. Department of Energy, Technical Information Center, Office of Public Affairs, Washington, D. C. 20585.

"The Home Energy Guide", J. Rothchild and F. Tenney, paperback published by Ballentine Books, 1978, New York.

"Energy Management Checklist for the Home", G. Pifer, U. S. Department of Agriculture, U. S. Government Printing Office, Washington, D. C.

"Energy Facts", Michigan State University Cooperative Extension Service, Lansing, Michigan 48824.

"Energy Related Fact Sheets", Service In Action Series, Colorado State University Extension Service, Fort Collins, Colorado 80523.

"Energy Facts - Save Energy - Save Dollars", University of Maine Cooperative Extension Service, Orono, Maine.

"Selected Department of Energy Publications", U. S. Department of Energy, Technical Information Center, Office of Public Affairs, Washington, D. C. 20585.

DEVELOPED BY

Micki (Mary) McMillan

assignment

Level I

1. "Meter Readers All", adapted from Energy & Man's Environment.
    - A. Discuss the need for energy by people at home.
    - B. Hand out sample meter reading worksheets.
    - C. Have students read and record their home electricity meters for a period of time. Have students calculate the kilowatt hours and cost.

Level II

1. Do assignment for Level I, plus the following:
    - A. Read your meters at home for seven days. Record your readings each day. Calculate the daily energy consumption. Which days require more energy? Why? Are weekends or weekdays more expensive?

2. List ways you can reduce your energy consumption by energy trade-offs, sharing, eliminating use of some appliances, etc.

3. Calculate the cost of your electric bill daily for seven days, according to local utility company rates.

    Time: Class time 2-3 days. Assignment will take 7 total days to complete.

Level II

1. Have students make a list of electrical appliances in their home.
2. Beside each item on their list, have each student write the estimated annual kilowatt hour (KWH) consumption for that appliance.
3. Add these figures to give the total KWH consumption for each family.
4. Divide this total by the number of persons in each family to arrive at a per capita annual KWH consumption.
5. Have a class discussion about which home appliances could be used less or discarded in order to reduce electrical consumption.
6. How would a reduction in use of appliances have an impact on your family?

assignment

Continued

7. Give a step by step description of how the decision making process could be applied to the reduction in usage of electrical appliances.

   Time: Three 45 minute class periods

Level I

1. Divide class into groups.
2. Have half the group make a collage demonstrating high energy products common in the home.
3. Have the other half make collages of energy efficient appliances.
4. Allow each group to explain their collage to the class. Discuss the pros and cons of using the different products.

   Time: Two class periods - 45 minutes long

Level II

1. Through class discussion, have the students devise a survey sheet for household energy consumption.
2. Interview people as to their awareness of energy consumption and the amount they actually spend on energy.
3. Find out how many people use high energy products which could be eliminated or reduced.

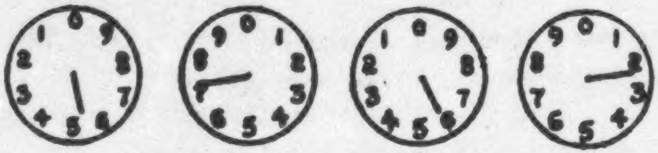
   Time: 2-3 class periods 45 minutes long

EVALUATION TECHNIQUES

1. Have students accurately read a gas and an electric meter. Students should be able to determine total energy consumption by subtracting their reading from a given meter reading. (Level I)
2. Through oral discussion, have students explain different appliances which are energy efficient compared to appliances which are higher consumers of energy. How important are the appliances which require higher energy levels to the family members? (Level I)
3. Have students orally discuss the idea of trade-offs for appliances. (Clothesline instead of dryer, cut down time on television or stereo, eating cold food for meals rather than using appliances for heating are only a few examples which could be discussed.) What impact does trade-off have on the family? How important is it in relation to energy conservation? (Level II)

assignment

How To Read Your Gas Meter



(thousands) (hundreds) (tens) (ones)

Meter Reading = 5762 units of gas

Sunday meter reading is 5,762

Next Sunday meter reading is 5,820

How much has home consumed?

5,820
5,762
58 units of gas

(Each "unit" = 100 cubic feet of gas)

Therefore:

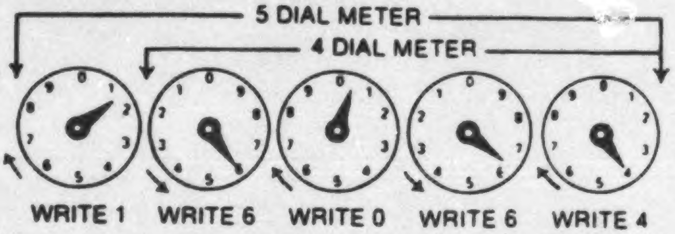
58 x 100 = 5,800 cubic feet of gas used.

To read a meter, record the numbers shown on each dial face, according to their place value. If a meter hand falls between two numbers, use the lower number.

assignment

How To Read Your Electric Meter

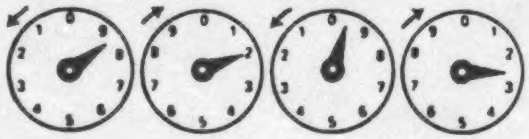
The dials are like watch faces lined in a row (every other dial moves counter-clockwise). The reading for a five dial meter would be 16,064. The reading for a four dial meter would be 6,064.



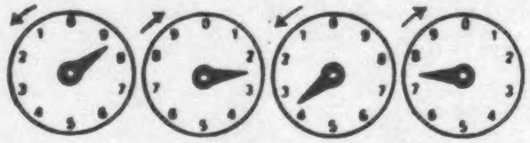
Notice that when the pointer is between two numbers, you should record the lower of the two numbers. When the pointer seems to be directly on a number, look at the dial to the right; if the pointer on the right side dial has passed "0", then write down the number the pointer seems to be on; if the pointer on the right side dial has not passed "0", then write down the previous lower number on the dial you are recording.

Record the Readings for the Following Meters

METER NO. 1

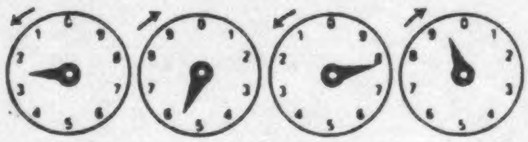


A ______________________________

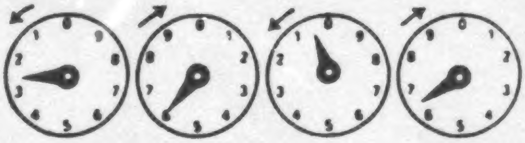


B ______________________________

METER NO. 2



A ______________________________



B ______________________________

Subtract the number of line A from the number on line B to find the number of KWH of electricity used.

Line B ______________________ Line B ______________________

Line A ______________________ Line A ______________________

KWH Used ____________________ KWH Used ____________________

NAME ______________________

assignment

Continued

4. If there is a Mass Transit System in the area, discuss its implications for future energy demands. Call the Mass Transit Company, find out the number of people who use the system, cost to each individual and their future plans for increasing or decreasing service. Find out if the System makes or loses money. What is their opinion on the future of the Mass Transit System? Discuss your findings. Time: 2-3 classes 45 minutes long.
5. Identifying poor energy uses (adapted from Energy & Man's Environment and revised):
    a. Study a local shopping center
    b. Identify all forms of energy being used in buildings and by motors or engines. Study the locality of the center. How accessible is it to customers for use of public transportation, walking, cycling, parking - proximity to other businesses that are used by the same customers.
    c. List any uses where more energy is being used than is needed.
    d. Write a plan showing how a committee of local people whose main purpose is to conserve our resources could help reduce the waste or any unnecessary use listed in c.

Level I & II

1. FHA Project - improve a nearby park to make it more attractive to the community to encourage use by local residents. Time: Variable

EVALUATION TECHNIQUES

Discuss the implication of Mass Transit on the urban family. Include financial and time factors as well as energy consumption. Set up a debate team to research and discuss all of the pros and cons. Discuss orally or in written form.

unit of instruction:
Low Energy Recreation

subject area:
Personal and Family Relations

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

After completion of this unit, the student should be able to demonstrate low energy social and recreational activities in which to participate.

SPECIFIC OBJECTIVES

By studying this unit, the student will be able to relate energy consumption with social activities in which he/she participates.

SUGGESTED ACTIVITIES - Level I

Make a drawing of social activities in which you are interested that require low energy consumption. Discuss advantages and disadvantages of participating in low energy activities. Time: One class period 45 minutes long

SUGGESTED ACTIVITIES - Level II

Write down all of the activities you and your friends participate in as a group. List all those which require high energy consumption and those which require low energy consumption. (Consider all transportation and appliance energy consumption.) Devise ways in which the high energy activities can be lowered in energy consumption yet be equally as fun and exciting. Utilize decision making in your discussion. Time: 1-2 class periods 45 minutes long

EVALUATION TECHNIQUES

1. Have students fill out this reporting form: (Level I)
    a. My social activities require (high/low) energy consumption.
    b. I feel it is (important/not important) to conserve energy when my friends and I get together.
    c. List 10 advantages and 10 disadvantages of making it a point to conserve energy when participating in social activities.
2. (Level II) Using the decision making process, discuss this statement: In ten years, social activities will have to be planned as to using extremely little energy because it will only be available for basic living necessities. What activities will you be able to participate in?

SUGGESTED MATERIALS AND RESOURCES

"Energy Fact Sheets", Colorado State University, Extension Service,
Fort Collins, Colorado 80523

Contact your local public utility company

DEVELOPED BY

Micki (Mary) McMillan

unit of instruction:

Recycling

subject area:

Personal and Family Relations

suggested for:

Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

To actively participate in recycling programs in order to reduce over-all energy consumption and use as possible sources of income.

SPECIFIC OBJECTIVES

As a result of studying this unit, the students will be able to show how recycling products can lead to energy conservation and savings.

SUGGESTED ACTIVITIES - Level I or II

1. FHA Project: Set up a school-wide recycling program with aluminum cans, newspaper, etc. Campaign about the money and energy saved by re-using these products rather than having to use "new" products. Get community involvement and participation to gain awareness to parents and businesses in the area. Time: 3-4 class periods
2. In class, develop a questionnaire or survey. Survey a group of people to find their feelings on recycling products. How many actively participate in recycling? How many feel the quality of life would be improved by recycling products? Discuss the results of the survey with the class. Level I can be a school-wide survey. Level II can be outside school. Time: 2-3 class periods 45 minutes long

SUGGESTED ACTIVITIES - Level II

1. Call a distributor of recyclable items (one involved with aluminum cans, plastic containers, metal containers, paper sacks, etc.). Find out the cost of recycling a container. Find the cost of using non-recycled materials for containers. Discuss the results. Time: 1-2 class periods 45 minutes long

EVALUATION TECHNIQUES - Level I

In a discussion, have the students discuss the financial and energy advantages of recycling. Discuss the impact recycling now has on the future, socially and economically.

EVALUATION TECHNIQUES - Level II

Have the students draw a pictorial essay of one product which is recyclable. Have them show the process by which the product is made initially (through commercial production) then the process by which it may be recycled. This evaluation could be done with a non-reusable product as well as for purposes of comparison and discussion. Information for this can be obtained after survey of local distributor or other business which uses and/or encourages people to recycle items.

SUGGESTED MATERIALS AND RESOURCES

Obtain recycling information from a local distributor, grocer or other business involved with using materials which are recyclable.

"Our Energy Problems and Solutions", Energy Conservation Research, 9 Birch Road, Malvern, Pennsylvania 19355, 1977 publication.

DEVELOPED BY

Micki (Mary) McMillan

unit of instruction:
Conserving Energy

subject area:
Personal and Family Relations

suggested for:
Level I (Junior High)
Level II (Senior High)

UNIT OBJECTIVE

After completion of this unit the student should be able to set priorities as to consumption of energy into needs and wants.

SPECIFIC OBJECTIVES

As a result of studying this unit, the student will be able to demonstrate ways in which he/she can change his/her living habits so that energy can be conserved.

SUGGESTED ACTIVITIES - See Assignments Attached

EVALUATION TECHNIQUES

Depleting Energy Sources (adapted from Energy & Man's Environment)

Describe to the students a situation wherein all energy sources were gradually being depleted. Ask each student to list ten or twenty activities which would change or cease under such circumstances. Bring class together for a discussion of their lists. Have papers turned in.

SUGGESTED MATERIALS AND RESOURCES

"Mickey Mouse and Goofy Explore Energy Conservation", Exxon Co., USA and Walt Disney Education Media Company, 1978. Exxon Co. Public Affairs Department, P. O. Box 2180, Houston, Texas 77001.

"Bringing Energy to the People", National Science Teachers Association, U. S. Department of Energy, Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37830.

"So What's New", manual and wall chart on energy history of the U. S., J. Kukert, U. S. Department of Energy, Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37830.

"The Home Energy Guide", by J. Rothchild and F. Tenney, Ballentine Books, 1978, New York (paperback). Information on hot water conservation and thermostat reduction to conserve energy.

DEVELOPED BY

Micki (Mary) McMillan

assignment

Level I & II

1. "Things I Like To Do" (adapted and revised from Energy & Man's Environment) Have the students make the following chart on a sheet of paper:

Things I Like To Do	$	E	e	F &/or M	10"	Date
1.						
2.						
3.						
4.						
5.						

Ask students to make a list of 20 things they like to do.

1. Place a $ sign by any item which costs more than $3.00 each time to do it.
2. Put an "E" in front of any item which uses a lot of mechanical energy to perform.
3. Put a small "e" next to the items that require a little mechanical energy to perform.
4. Using the code letters "F" and "M", record which of the items on the list they think their father or mother might have had on their lists if they had been asked to make one at your age.
5. Place a number "10" in front of any item which they think would not be on their list 10 years from now.
6. Go down through the list and place near each item the date when they did it last.
7. Under all "E" headings list at least one alternative that could fall under the "e" categories that they would enjoy.

Time: 1-2 class periods 20 minutes long

2. Study the amount of energy that can be saved by taking a 5 minute shower compared to taking a bath in a tub full of water. How many gallons of water can be saved by showering rather than bathing? (Emphasize that hot water is one of the largest consumers of energy in the household. Time: 1-2 class periods 45 minutes long

3. Have students write short skits on the use of electrical appliances which could be eliminated in order to save energy. Example: Elmer the electric toothbrush vs. Magdaline the manual toothbrush, Popeye the electric pencil sharpener vs. Harold the hand driven pencil sharpener. (Other appliances include the electric typewriter, knife sharpener, etc.) Have the students perform their skits in front of the class to point out that luxuries such as these are items which could be eliminated rather easily in most households. Time: 2-3 class periods 45 minutes long

Level II - continued

WATTAGE CHART

How much electricity do your three important items consume? How about those items you eliminated? The following estimates prepared by the Electrical Energy Association give the approximate power consumed by home appliances used for a year under normal conditions. How many items would you have to eliminate so that the annual savings would be 500 KWH? Would you feel "deprived" without these appliances? If you would not avoid using these appliances just to save money, could you stop using them during the energy crisis? (It should be noted that the high energy consumers are the appliances which produce heat and cold.) Est. KWH Consumed Annually:

Water Heater	
(Standard)	4,219
(Quick-Recovery)	4,811
Air Conditioner (Room)	1,389
Refrigerator	
(Standard 12 cu. ft.)	728
(Frostless 12 cu. ft.)	1,217
Freezer	
(Standard 15 cu. ft.)	1,195
(Frostless 15 cu. ft.)	1,761
Refrigerator/Freezer	
(Standard 14 cu. ft.)	1,137
(Frostless 14 cu. ft.)	1,829
Range	1,175
Self-Cleaning Oven	1,146
Clothes Dryer	993
Television	
(Color)	502
(B & W)	362
Dehumidifier	377
Dishwasher	363
Microwave Oven	300
Attic Fan	291
Roaster	205
Frying Pan	186

Portable Heater	176
Window Fan	170
Humidifier	163
Iron	144
Rollaway Fan	138
Radio/Record Player	109
Coffee Maker	106
Washing Machine	103
Broiler	100
Radio	86
Trash Compactor	50
Circulating Fan	43
Toaster	39
Waste Disposer	30
Clock	17
Sun Lamp	16
Floor Polisher	15
Blender	15
Hair Dryer	14
Mixer	13
Sewing Machine	11
Carving Knife	8
Shaver	1.8
Toothbrush	0.5

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unit of instruction:	subject area:	suggested for:
Future Energy Sources	Personal and Family Relations	Level I (Junior High) Level II (Senior High)

UNIT OBJECTIVE

After completion of this unit, the student should be able to develop awareness of future energy sources.

SPECIFIC OBJECTIVES

As a result of this unit, the student will be able to describe how their lifestyles will be in the future when many of our current energy sources will no longer be available.

BACKGROUND INFORMATION

Have a resource person come to class to discuss future energy problems and possible solutions. The resource person may be a city government worker, college professor or student of energy engineering and research, a local utility company representative or an extension service representative who is familiar with future energy implications.

SUGGESTED ACTIVITIES - See Assignments Attached

1. Discuss the renewable energy sources which will become more and how they will affect our lifestyles. Level I. Time: 1-2 class periods 45 minutes long
2. Brainstorm as to what living conditions will be like in the future. Discuss how families may be affected. What will happen to the single person, the elderly, the small career oriented family (dual role). Discuss. Level II. Time: 1 class period 45 minutes long
3. Depleting Energy Sources (attached) Level I, from Energy & Man's Environment.
4. A Trip to the New Earth (attached) Level II, from Energy & Man's Environment.

EVALUATION TECHNIQUES

1. Illustrate with drawings, collage or write a futuristic story about the following with the only limit being no source of gasoline for public use:

   In 10 years we have no available gasoline. How will we live? What are our alternatives? How will our lifestyles change? Consider the following: recreation, families, social occasions, places of employment in relation to the dual role, transportation, communication, population. (Level I)

2. In writing or orally discuss the following:
   - Will it be a necessity for every household to have one fulltime homemaker to deal with child care and domestic duties in order to reduce energy consumption?
   - What will happen to extra-curricular activities for students?
   - Will people be moving from city to city as much or will families be forced to settle down permanently in one community?

Continued

- How will families deal with vacations? Will they be a thing of the past?
- What other aspects of our lifestyles will be affected by the need for energy consumption?

Discuss the social and economic as well as psychological impact this will have on people of the future. Do you think people will be able to adjust very well? Why or why not?

SUGGESTED MATERIALS AND RESOURCES

"Sources of Information on Alternative Energies", National Solar Heat and Cooling Information Center, toll free number (800) 523-2929, P. O. Box 1607, Rockville, Maryland 20850.

"U. S. Energy Through the Year 2000", U. S. Department of Interior, U. S. Government Printing Office, Washington, D. C. 1972.

DEVELOPED BY

Micki (Mary) McMillan

assignment

Depleting Energy Sources

Concept: All sources of energy are limited; most can be used only once.

Describe to the students a situation wherein all energy sources were gradually being depleted. Ask each student to list ten or twenty activities which would change or cease under such circumstances. Bring the class together for a discussion of their lists. Have papers turned in. Time: One 45 minute class period

A Trip to New Earth

Concept: All sources of energy are limited; most can be used only once.

1. Introductory statement: Because the Earth will not be habitable soon, due to various human activities, (war, pollution . . .)... your crew (group) of two girls and two boys has been chosen to make an exploratory visit to another planet. The closest, most suitable "New Earth" is in another solar system and will require 20 years of travel to reach with present spaceship technology.
    a. Your crew will never return to Earth but will set up initial colonization of the planet in preparation for future arrivals from Earth. You will also be expected to formulate guidelines to assure that the same disaster (see above) does not occur on New Earth.
    b. Your spaceship can only carry, supply, or produce enough space, oxygen, water, and food for eight persons for 15 years. You may take 100 pounds of cargo per person in addition.
    c. Have students speculate on the size, shape, and general construction of the spaceship.
2. Day 1: List the equipment you would take with you (100 lbs. per person) in order of importance. (For each item give name, weight, and use or reason for taking.) Use slides or taped music from Earth during Day 1.
3. Day 2: Come to class dressed for the voyage.
    a. Bring samples to class and/or pictures of the items listed the first day.
    b. Make a list of rules necessary for survival to be established aboard ship.
4. Day 3: Have students develop a list of problems which might arise during the journey.
    a. Identify eight or ten of the most interesting problems and list possible solutions to the problems.

assignment

Continued

b. Teacher may wish to direct the discussion to include some or all of the following:

1. How could a population of eight people (present group and births) survive the journey on 15 years' worth of resources? (Hint: What equipment would you take as cargo to produce resources?)
2. What do you think will happen if five children are born in the twenty years? Why?
3. What if salt is accidently poured in the fresh water supply?
4. What if a fire contaminates the air supply?
5. What will be done about wastes? Why?
6. What other problems are possible aboard the spaceship? Why? Possible solutions? (Hint: Getting along with each other, etc.)

5. Day 4: List as many rules for survival as you can that you would establish on the New Earth to insure indefinite well-being and quality of life on the planet.

   a. What other living things besides humans would you like to have on New Earth? Why?

   b. What other living things would be necessary for your survival on the new planet? Why?

   c. Draw and color three poster scenes: One aboard ship, another of "old earth", another of New Earth.

6. Day 5: Summary questions (class discussion):

   a. In what ways is our Earth a spaceship?
      - How is our Earth like your spaceship? How is it different?
      - Will the same rules for survival on the spaceship be necessary and work on Earth? Why or why not?

   b. Groups orally present week's work to class.

   c. Summary discussion of week's work, value, and applications to real life situations by entire class.

   d. Slides and taped music (Earth).

Time: 5-7 class periods 45 minutes long

Suggested Career Education Activity: Given an opportunity to list the skills necessary for a spaceship journey, the student will be able to identify occupations which most closely match the needed skills and to identify the basic skills and attitudes which are necessary for all members of the spaceship crew.

PERSONAL AND FAMILY RELATIONS RESOURCES

Energy Use and Utilities - Consumer Decisions, A Handbook of Consumer Education, Boyd/Stovall, Allyn & Bacon, Inc., 1978, p. 83-88.

How to Conserve Energy at Home, L. Channing, Bete Co., 1975, Greenfield, Massachusetts.

Save Energy: Save Money, Eccli, Eugen and Eccli, Office of Economic Opportunity, Washington, D. C. 20505, 1975.

Tips for Energy Savers: In and Around the Home, On the Road, In the Marketplace, Federal Energy Administration, Washington, D. C., 20461.

Conserving Energy by Changing Societal Goals, Illinois Teacher, September/October 1976.

The Homeowner's Survival Kit, Watkins, Hawthorne Books, 1971.

"Alternative Energy Sources", American Petroleum Institute, Attn: Information Service Department, 2101 L. Street, N.W., Washington, D. C. 20037. Phone: (202) 457-7000.

"Synergy - Working Together for Energy Tomorrow", North Carolina State University, Agricultural Extension Service, Raleigh, North Carolina 1978.

"Energy Conservation and Environment", U. S. Department of Energy, Technical Information Center, Office of Public Affairs, Washington, D.C. 20585.

"Energy Conservation Now", Consumer Information Center, Pueblo, Colorado, 81009.

"Energy Conservation and the Rural Home", U. S. Department of Agriculture, Office of Governmental and Public Affairs, Washington, D. C. 20250.

FILM: "Energy: The Facts - The Fears - The Future", produced by CBS News 1977. Russ Bensley and Ernest Lieser.